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Appendices only

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A systematic review to examine the impact of psycho-educational interventions on health outcomes and costs in adults and children with difficult asthma

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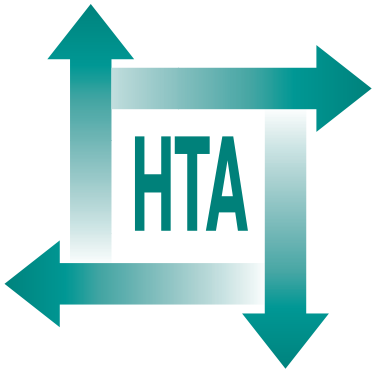

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Appendix 1

Existing reviews of psycho-educational interventions in asthma

Abbreviations: ADJ, adjacent to (in database searching); CCT, controlled clinical trial (i.e. non-randomised); MA, meta-analysis; OR, odds ratio; RCT, randomised controlled trial; RR, relative risk; SA, sensitivity analysis; SH, subject headings (in database searching); SMD, standardised mean difference.

Reviews of psycho-educational interventions in mixed diseases

			Search terms				
Authors	**Patients**	**Intervention description**	**Asthma**	**Intervention**	**Methods**	**Data extracted**	**Results and conclusions**
AETMIS, 2001[93]	Patients with obstructive respiratory problems (asthma, COPD)	Self-management programmes: education programmes that teach patients about disease, self-monitoring of respiratory function (peak flow/symptoms/ combination) and action plans which may include periodic health examination	Not stated	Not stated	• Searched MEDLINE, Cochrane, followed up on Internet and with author contacts • Selection criteria and procedures not described • Level of evidence classification undertaken	Data not formally extracted or summarised, description of studies and results only	• Self-management education (combination of education and self-monitoring/action plan) recommended for adults on basis of Gibson *et al*. review but awaiting further evidence in children as conflicting results from existing reviews • Symptom and peak flow monitoring deemed equally effective, no recent evidence on optimal use or structure of action plan (e.g. zone versus action threshold) • Evidence lacking on **effectiveness** (vs efficacy), particularly in specific contexts (i.e. considering local guideline adherence, existing education, barriers related to communication, organisation, funding), and on safety and optimal organisation • Experts recommend self-management for moderate-severe asthma but no evidence to support this and poor control may be best indicator • Recommends examination of components/factors influencing self-management to assess likely effectiveness in specific contexts • Optimisation of drug therapy crucial, self-management education aids this by improving adherence to guidelines by physicians and adherence to treatment by patients • 'Web of causality' proposed to describe complex interactions between components of self-management

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Bauman *et al.*, 1997[85]	Children with chronic health conditions (asthma, cancer, epilepsy, mixed diagnoses)	• Psychosocial: addressing psychological, developmental and social needs • Planned (vs naturally occurring) • Excluding innovative service arrangements, medical or physical therapy, treatment regimens • Designed to improve psychosocial (not health) outcomes	Not stated	Not stated	• Searched 1 medical, 1 psychological database, ref. lists and contacted authors • Specific selection criteria related to publication status, patient group, intervention, outcomes (psychosocial), methodological quality (sample size >15 per group, random/ matched/convenience but not historical control group), language (English only) • 2 reviewers assessed eligibility and extracted data using 3 forms. Disagreements resolved by consensus	• Intervention: type, target group, intensity, integration with medical care, training of interventionist, use of manual, consistency monitored • Theory: extent theory used to develop, extent rationale presented to explain how effects achieved, role of theory in selection of outcomes, measures used, timing, power • Methodology: randomised/ matched/convenience control, sample size, sample representativeness, socio-demographics, illnesses, losses to follow-up, replication study, outcomes, findings, clinical importance	• 16 of 266 articles eligible (= 15 programmes), 7 targeted asthma alone. Heterogeneity and small numbers precluded MA • Descriptions lacking in studies, most educational, one-third theory-based, rationale often lacking • Samples varied, various measures used, 10 studies randomised • 3 of 7 asthma studies showed improvements in psychosocial outcomes (self-management, self-efficacy, locus of control, anxiety, behaviour)

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Cambach *et al.*, 1999[90]	Adult patients (18+ years) with asthma and COPD	Pulmonary rehabilitation with exercise training (some also including education, relaxation, psychological support)	SH: pulmonary, obstructive	SH: rehabilitation, exercise	• Searched MEDLINE, Current Contents, ref. lists • Selection criteria related to language (English, Dutch, German only), interventions, patients, outcomes (exercise capacity, QoL), comparison (exercise vs no exercise), reporting sufficient data • Criteria and 20-item quality checklist applied by 2 reviewers with reference to a third for disagreements	Reports sample size, allocation method, setting, severity, age, disease, components of intervention, duration, frequency, exercise duration, intensity and mode, outcome measures	• 79 studies identified, with 18 selected (3 included asthma patients), most with methodological shortcomings • MAs showed exercise training significantly improved 3 measures of exercise capacity (mean effect sizes ranging from 0.4 to 1.2, all $p < 0.0001$) and various domains of QoL (mean effect sizes ranging from 0.5 to 0.7, all $p < 0.001$). Heterogeneity in endurance time was to some extent accounted for by differences in severity. • SAs showed type of analysis, study design, patient group, severity, setting or comparison did not significantly influence conclusions
Conte and Karasu, 1981[84]	Patients with medical conditions (ulcer, colitis, abdominal disorders, asthma, migraine, skin disease, cardiovascular disease, hypertension)	• Psychotherapy: dyadic and group therapy (psychoanalytic, supportive, didactic etc.) • Excluding hypnosis, behaviour modification, biofeedback, relaxation	Not stated	Not stated	• Searching and review strategy not described. • Only controlled studies included (methods to assess not described), quality rated poor/adequate/good according to scale	Reports illness, sample size, intervention, concurrent intervention, control, follow-up, results, design problems, assessment of quality	• 18 studies of which 2 in asthma identified – both group psychotherapy with standard treatment as necessary (one psychoanalytically oriented) • Asthma morbidity reduced in one, not other. Psychological status assessed and shown to improve in one study

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Devine and Pearcy 1996[91]	Adults with COPD (some studies included patients with asthma)	• Psycho-educational care: education, behavioural skill development (e.g. muscle relaxation, biofeedback, hypnosis, systematic desensitisation), cognitive therapy (e.g. problem solving), non-behavioural support counselling • Excluded exercise only	COPD	Patient/client education, counselling, behavioural therapy, pulmonary rehabilitation, relaxation therapy	• Searched 4 databases, dissertations, conference proceedings, ref. lists • Selection criteria related to intervention, patients, design (experimental, quasi-experimental, pre-post), sample size (>5 per group), common source of patients in each group, disease-specific outcomes (not cognitive knowledge) • Random sample of studies subjected to dual data extraction with inter-rater reliability reported, undertaken with some blinding to effects	• Study characteristics: date, author's profession, random allocation, control group type • Sample characteristics: socio-demographics, time since diagnosis • Intervention: content, duration, timing, frequency, mode of delivery • Setting: country, site • Outcomes: measures, sample size, direction and magnitude of effect	• Overall search results not reported but 65 studies selected, of which 28% included patients with asthma, 34% were randomised and 15% had a placebo-type control group • MAs showed significant effects of comprehensive pulmonary rehab. on most outcomes (effect sizes >0.58 for psychological well-being, endurance, functional status, exercise capacity, dyspnoea and adherence), but rehab. including education alone, education alone and relaxation therapy showed significant effects on no more than 2 outcomes, although research on these was more limited

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Haynes *et al.*, 2003 (Cochrane Review),[88] McDonald *et al.*, 2002[89]	Patients prescribed medication for a medical or psychiatric disorder	Interventions intended to improve adherence with prescribed, self-administered medications	N/A	Varied by database, but included patient compliance (SH), patient ADJ compliance, patient dropouts, psychotherapy, treatment refusal, patient education, regimen, adherence (unclear whether terms for outcome or intervention)	• Searched 7 databases and contacted authors • Selection criteria related to patients, interventions, outcomes (medication adherence plus treatment outcomes), types of studies (unconfounded RCTs with 80% and 6-month follow-up). • Criteria applied by 2 reviewers with disagreements resolved by discussion • Study quality assessed using adapted Jadad scale • Data extraction not described	Reports study methods, clinical problem and participants, intervention, control condition, clinical and adherence outcomes	• 6568 citations identified of which 549 retrieved, 34 (reporting 33 trials) selected • Clinical heterogeneity due to range of interventions did not permit MA • 5 asthma studies identified, 2 showing clear positive effects of intervention on adherence and treatment outcomes, one with questionable positive results and two with no effect • Number of components of intervention type (behavioural, cognitive, social) did not appear to influence outcomes overall

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Kibby *et al.*, 1998[86]	Children and adolescents (<18 years) with chronic medical conditions (headache, rheumatoid arthritis, cancer, diabetes, asthma, cystic fibrosis, renal disease, heart disease)	Psychological interventions: • Addressing disease management (psychosocial and developmental factors influencing treatment), emotional/ behavioural problems (reducing distress), health promotion, prevention • Intervening with patient (not just family), conducted by psychologists and paraprofessionals • Behavioural (cognitive–behavioural therapy, behaviour modification, biofeedback, relaxation, distraction), non-behavioural (psychodynamic, hypnosis, family therapy), didactic	N/A	• CINAHL/ MEDLINE: nursing, social work, rehabilitation, psychology, psychotherapy • PsycLIT: therapy, intervention	• Searched 3 databases, ref. lists and handsearched 2 journals • Selection criteria related to patients, date of publication (>1990), intervention, design (between or within group, >3 per group) • 20% dual coded with disagreements resolved by discussion	Data not summarised separately for each study, only overall observations and findings described	• 3000+ reviewed, 42 studies included, 6 in asthma. No difference in effect size for between vs within designs so all included in MAs • MA demonstrated significant overall effect of psychological interventions (mean effect size = 1.12, $p < 0.001$) • Interventions aimed at disease management (mean effect size = 1.28, $p < 0.001$) and emotional/behavioural concomitants (mean effect size = 0.97, $p < 0.001$) were equally effective, those aimed at health promotion and prevention were too small in number for meaningful analysis • Most subtypes of behavioural interventions and non-behavioural interventions showed similar effects (mean effect sizes ranging from 1.00 to 1.50). There were too few didactic interventions for meaningful analyses of these • Significant effects of behavioural interventions were seen in psychophysiological outcomes, healthcare use, distress, knowledge and psychosocial problems (other intervention types were too small in number for analysis) • No breakdown by disease

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
McQuaid and Nassau 1999[87]	Children and adolescents with asthma, diabetes or cancer	Psychological treatments	Asthma	Reported only as those relating to psychological treatment, e.g. treatment, intervention, therapy, relaxation, biofeedback	• Searched 2 databases, ref. lists • Selection criteria related to patients and intervention • Assessment and data extraction procedures not described • Study quality not formally assessed but intervention efficacy graded on basis of evidence	Reports sample, diagnostic criteria, design, baseline assessment, measures, treatment protocol, results, follow-up	• Search results not described • 6 relaxation training, 6 biofeedback, 2 family therapy studies in asthma identified • Relaxation rated as 'probably efficacious' especially in those with emotional triggers, certain types of biofeedback rated as 'well established', family therapy as 'promising' but quality of research limited in all cases • Suggests need for evaluations alongside medical treatment

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Weir *et al.*, 1998 (NZHTA)[92]	Patients experiencing acute respiratory admissions for asthma, COPD, respiratory tract infections, influenza	Medical, organisational and psycho-educational interventions used in outpatient settings (excluding those directed against environmental factors)	Asthma, lung diseases – obstructive (SH), bronchial diseases	'Referral and consultation', medical audit, family practice, physicians –family, physicians practice patterns, general practi*, socioeconomic factors (SH), quality of care (SH), health services accessibility, nurse practitioners, inter-professional relations, guideline* OR recommend* OR consensus, guideline (SH), outpatient clinics – hospital, ambulatory care, patient education, self-care (SH), outpatient	• Searched recent (>1993) versions of 9 databases, local catalogues, HTA and other websites, ref. lists • Selection criteria related to patients, intervention, design (any except economic analyses), language (English only), quality (participation rate >50%, sample size >30), baseline similarity between groups, generalisability to NZ context, publication type (not opinion pieces, letters or abstracts) • Single reviewer applied criteria, extracted data using critical appraisal forms standardised by study design and graded level of evidence	Reports disease, study location, design and evidence grading, intervention, setting, age group, sample size, follow-up, results	• Overall search results not described, MA not possible • 1 systematic review (Gibson *et al.*) and 3 RCTs of self-management strategies for asthma reporting on admissions were identified. There was no evidence from these (absolute risk reduction ranging from 1 to 3%) and evidence from only 1 of 6 observational studies that these strategies reduce the rate of admissions for acute asthma. Noted that there may be a lack of power in studies to detect differences, follow-up was relatively short and those with severe asthma tended to be excluded • Of 8 RCTs and 1 MA of self-management strategies reporting on health service use other than admissions, some showed some statistically significant results • Studies on implementation of guidelines (2 before-and-after, 3 cross-sectional), provision of observation wards (1 RCT, 2 before-and-after), nurse-run clinics (2 RCTs) and other organisational and medical treatment strategies were also reviewed. For these, firm conclusions could only be drawn regarding the effectiveness of inhaled steroids in the prevention of attacks

Reviews of psycho-educational interventions in patients of mixed ages with asthma

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
FitzGerald and Turner, 1997[145]	Patients at high risk from their asthma – at risk of fatal/near-fatal asthma on basis of several characteristics	Asthma education, combined with changes in medical management	Not stated	Not stated	No formal search or review methods described – primarily a discussion paper	Reports year, country/setting, age, duration, educator, target, materials, design, comparison, number of eligible patients, number of patients enrolled, number of patients evaluated, outcomes (ED visits, hospitalisation, deaths)	• 8 studies reviewed of which 5 RCTs (3 quasi-random), 3 observational • Included patients hospitalised with severe or life-threatening attacks and emergency attenders • All described interventions combining education with changes in medical management, most were outpatient with physician primarily involved in 4, nurse alone in 3, nurse and physician in 1 • No formal qualitative or quantitative synthesis of results or firm conclusions drawn
Hackman *et al.*, 2000[96]	Patients with asthma	Hypnosis	Not stated	Not stated	No formal methods described but categorised studies on basis of degree of randomisation and control	Reports subjects, assessments, methods and treatment, results	• 20 studies cited • Uncontrolled and non-randomised studies showed significant effects, especially in susceptible patients and children, but results from randomised studies equivocal

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Huntley *et al.*, 2002[97]	Patients with asthma	• Relaxation therapies (progressive muscle relaxation, mental and muscular relaxation, hypnotherapy, autogenic training, biofeedback) involving self-practice of psychophysiological techniques to promote physical or mental relaxation • Excluded yoga and breathing techniques	Asthma	Relaxation therapy, autogenic, biofeedback, hypnosis, meditation	• Searched 4 databases, own literature, ref. lists • Selection on basis of patients (clinical diagnosis), intervention, design (RCTs only) • Criteria applied by 2 reviewers, agreement reached by discussion • Data extraction by two reviewers on purpose designed forms • Study quality assessed using Jadad scale	Reports sample characteristics, design, intervention, control, drop-outs and withdrawals, quality score, primary measures, results	• 15 studies identified of which 9 selected on basis of providing statistical comparisons, but pooling of results not undertaken • 2 of 5 trials of progressive mental/muscular relaxation showed significant effects. 2 studies of biofeedback, 2 of hypnosis showed no significant effects • Poor methodological quality, hence good evidence lacking

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Lehrer *et al.*, 1992[75]	Asthma patients	Psychological approaches: psycho-educational self-management programmes, stress management approaches (relaxation therapy, electromyo-graphic biofeedback in relaxation), biofeedback, family therapy	N/A	N/A	No formal methods described – primarily a discussion paper on types of intervention, selected research evidence, areas for future research	Studies not formally summarised	• On basis of reviews and individual studies cited, concludes psychological approaches, especially relaxation and psycho-education, may be useful • Identifies need for further research, in particular to investigate patients who benefit, use of formal psychological techniques and effective components
Toelle and Ram, 2003 (Cochrane review)[98]	Adults or children with a clinical diagnosis of asthma given by doctor and who required frequent daily use of medications to control asthma	• Individualised written instructions on actions to take for regular asthma management and/or in the event of an attack based on symptoms or peak flow • Excluded studies evaluating additional interventions	Asthma Wheez*	Action plan, self, self-care, self-manag*, educ*	• Searched Cochrane Airways register, Cochrane CENTRAL, ref. lists and contacted authors • Selection criteria related to patients, intervention, study type (RCTs) • Criteria assessed by two reviewers with disagreements resolved via discussion • Quality assessed by two reviewers using Cochrane system and Jadad scale • Data extraction by two reviewers	Reports study characteristics, methods, participants, intervention, outcomes, quality	• 108 studies identified of which 44 retrieved and 6 RCTs included • There were only single studies reporting each outcome for written plans compared with no intervention, hence no consistent evidence that plans produced better patient outcomes than no plans • There were conflicting results in studies comparing different types of plans (e.g. symptom vs peak flow)

Reviews of psycho-educational interventions in children with asthma

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Bernard-Bonnin *et al.*, 1995[73]	Children with asthma	Self-management teaching programmes: interactive/one-to-one intervention to educate child/family on self-management skills	Asthma	Education, self-management programmes	• Searched 2 medical, 1 nursing, 1 dissertation abstract databases, ref. lists and contacted authors • Selection criteria (unclear who assessed) related to study design (RCT), age, confirmed diagnosis, intervention type, morbidity outcomes, language (English, French) • RCT quality scale assessing design and analysis used by 5 authors and consensus reached	Not described – only composite information on study quality and outcomes reported	• Initially 23 of 106 identified references selected, reduced to 11 studies after formal eligibility assessment • Quality scores fair (half scored >50%) • MAs of attacks (3 studies), absenteeism, hospitalisations, hospital days, emergency visits (5 studies) showed minimal impact on morbidity outcomes (range –0.11 to 0.14 pooled effects sizes across all outcomes)

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Haby *et al.*, 2003 (Cochrane review)[105]	Children (0–18) who have attended the emergency room for asthma (defined by doctor's diagnosis or objective criteria), with or without hospitalisation within the previous 12 months	Asthma education (including information, counseling, change in therapy, peak flow/symptom monitoring and/or use of a written action plan)	Asthma, wheez*	Educat*, self manag*, self-manag*	• Searched Cochrane Airways register, ref. lists and contacted authors • Selection criteria related to patients, intervention, outcomes (emergency visits, other healthcare use, lung function, medication use, absenteeism, symptoms, QoL, cost), study design (RCTs, CCTs) • Criteria assessed by two reviewers, with disagreements resolved by discussion • Quality assessed using Cochrane system and Jadad scale	Study, methods, participants, interventions (inclusion of information, self-monitoring, medication adjustment, action plan, control group, description), outcomes, notes	• Searched identified 400+ citations, of which 80 potentially relevant, 8 selected, 7 reviewed to date (1 awaiting translation) • Significant heterogeneity in results, even within subgroups related to type and timing of intervention, but MAs still conducted • MAs providing pooled RRs demonstrated no significant reductions in emergency visits (4 trials, 0.87), admissions (5 trials, 0.74) or unscheduled doctor visits (5 trials, 0.74). Other outcomes were reported only in single studies and although some showed benefits, MAs for subgroups showed similar pooled effects and the reasons for some trials showing benefits and others not were unclear • Concludes there is no firm evidence to support the use of asthma education for children who have used A&E

continued

	Search terms						
Authors	**Patients**	**Intervention description**	**Asthma**	**Intervention**	**Methods**	**Data extracted**	**Results and conclusions**
Pagliari *et al.*, 2003 (Cochrane Protocol)[106]	Children (< 18 years) with diagnosis of asthma from physician/ according to international criteria	• Psychotherapeutic interventions: behavioural therapies, cognitive therapies, cognitive–behavioural therapy, relaxation techniques (progressive relaxation, autogenic training, guided imagery, hypnotherapy, biofeedback), psychodynamic psychotherapies (psychoanalysis, psychosomatic therapy, hypnosis), counselling (supportive counselling, interventions labelled counselling), group therapy • Breathing retraining and education where part of complex psychotherapeutic intervention • Family therapy, education alone, breathing retraining alone excluded	Asthma* Wheez*	Psychotherap*, group psychotherap*, psycholog*, psychosocial, counselling, group counselling PsycInfo SHs: Psychothera-peutic techniques, psychotherapy, cognitive techniques, personal therapy, therapeutic processes, counselling	• Searched Cochrane Airways register, PsycINFO, ref. lists and contacted authors • Selection criteria related to patients, intervention, outcomes (symptoms, medication use, lung function, health service use, knowledge, psychological outcomes, behaviour, absenteeism), study type (RCT, CCT) • Criteria being assessed by two reviewers with disagreements resolved by discussion • Quality being assessed using Cochrane system and modified Jadad scale. • Data extraction not described	Not reported	Not yet available

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Panton and Barley, 2003 (Cochrane Review)[103]	Chronically asthmatic children receiving prescribed medication and their families	Family therapy: based on systemic theories which focus on whole family and conducted by trained family therapists	Asthma (SH) Asthma* Wheez*	Psycho* AND compliance, cognit* AND therap*, psychotherap*, family therap*, family AND therap*. PsychLIT SHs: family therapy, psychotherapeutic techniques, psychotherapy, child psychotherapy, adolescent psychotherapy, cognitive techniques, personal therapy, therapeutic processes, counselling, dysfunctional family	• Searched Cochrane Airways register, PsychLIT, ref. lists and contacted authors • Selection criteria related to patients, intervention, comparison (pharmaceutical intervention alone), outcomes (lung function, clinical assessment, medication use, symptoms), study design (RCTs, CCTs) • Criteria applied by one reviewer • No formal quality assessment reported	Reports study, methods, participants, interventions, outcomes, notes, allocation concealment	• 24 relevant studies identified, of which 2 included • MA not possible owing to differing outcomes reported • No difference in FEV or medication use in either study. One showed improvements in gas volume, PEF, daytime wheeze, other effects on overall clinical assessment, number of functionally impaired days • Concludes family therapy may be useful adjunct but need for further and more up-to-date research as both studies reviewed conducted prior to implementation of asthma guidelines

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Velsor-Friedrich and Srof, 2000[101,102]	Children with asthma	Self-management programmes	Asthma	Education, patient education	• Searched CINAHL and MEDLINE from 1990 to 1999, websites, ref. lists • Excluded camp or technology-based programmes (formal selection criteria and further review methods not described) • Critiques studies in terms of their focus, methods and/or reporting	Reports name and description of intervention, purpose, design, target sample, instruments, variables, analysis, findings, critique	• Identified and reviewed 18 studies published between 1990 and 1999 and also comments on previous reviews • Identifies that advances have been made in the development and evaluation of self-management programmes and addressing gaps in the research literature, but recommends more research on preschool children and adolescents, higher quality studies targeting minority groups, greater focus on health outcomes and cost-effectiveness, more studies including school personnel and further evaluation of community-based programmes
Wigal *et al.*, 1990,[99] Creer *et al.*, 1990[100]	Children with asthma	Self-management programmes designed to teach self-management skills	Not stated	Not stated	• No formal methods described as narrative review • Assesses quality against 12 criteria related to patient selection, design of intervention, methodology and interpretation of results	Individual studies described, formal report of patients, design, intervention, findings, quality	• Reviewed 19 studies published between 1972 and 1988 • Concludes that overall self-management programmes produced positive changes in the lives of children with asthma and their parents • The majority of the programmes failed to satisfy a number of quality criteria with only 5 satisfying more than 9 out of 12

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Wolf *et al.*, 2003 (Cochrane Review)[104]	Children with asthma (aged 2–18 years)	Self-management education programmes targeting children/ adolescents or their parents designed to teach management strategies related to prevention, attack management or social skills using any instructional strategy or combination of strategies in group or individual settings	Asthma (SH), respiratory sounds (SH), Asthma*, Wheez*, Bronchial NEAR hyper-reactiv*	Education*, self management, self-management	• Searched Cochrane Airways register, PsycLIT, ref. lists, reviews • Selection criteria related to patients, intervention, outcomes (lung function, morbidity/functional status, self-perceptions, healthcare use), study type (RCT, CCT) • Criteria applied by two reviewers with disagreements resolved by consensus • Quality assessed using Cochrane system. • Data extracted on standard forms	Study (date, country), methods (design, randomisation, blinded assessment, follow-up), participants (number, demographics, inclusion criteria, severity, completion rates), interventions (description, topics covered, numbers of sessions, duration, type, setting, self-management strategy, mode of delivery), outcomes, notes, allocation concealment	• 318 studies identified of which 45 potentially eligible, 32 (including 26 RCTs) selected • MAs providing pooled SMDs demonstrated significant effects on lung function (4 trials, 0.50), school absences (16 trials, –0.14), restricted activity days (6 trials, –0.29), emergency visits (12 trials, –0.21), self-efficacy (6 trials, 0.36) and nights disturbed when using a fixed effects model only (3 trials, –0.34) but not on attacks (5 trials, –0.21), severity (4 trials, –0.15) or other healthcare use or on proportions experiencing morbidity or health service use outcomes • Subgroup analyses suggested effects on lung function evident in the short term and morbidity outcomes in the medium term with long-term data on effectiveness lacking • Self-management strategies based on PEF appeared to have greater effects than symptom-based strategies • Interventions with different modes of delivery (group vs individual) and intensity showed similar effects • CCTs and poorer quality studies tended to show greater effects • Greater effects on a number of outcomes seen in studies of moderate–severe compared to mild–moderate asthma • Subgroup results are tentative and there is a need for more direct comparisons of different intervention strategies, amongst different patient groups

Reviews of psycho-educational interventions in adults with asthma

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Clark and Nothwehr, 1997[67]	Adults with asthma	Self-management education programmes: designed to enhance capacity to control the effects of disease	Not stated	Not stated	• No formal searching or review methods described as primarily a narrative review with discussion of broader issues related to self-management education • In summarising results of individual studies, included only trials with randomisation and sufficient sample sizes (methods to assess quality not described)	Reports study year, age range, educator, format (group/individual), sample size, follow-up, outcomes and findings	• 32 studies identified, of which 18 RCTs • Some evidence of positive effects of self-management on knowledge (in 6 studies), psychological status (in 3 studies), compliance/self-management behaviour (in 5 studies), symptoms (in 4 studies), healthcare use (in 11 studies) and medication use (in 2 studies) • No study showed positive effects on all dimensions of outcome and half discussed outcomes where no change was evident • Concludes that there is impressive evidence on the benefits to be gained from educating adults about self-management but various areas for further research and factors to be taken into account when designing interventions are discussed

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Day, 2001 (NZHTA)[108]	Adults with chronic or acute asthma	Asthma education and self-management: • All types of asthma education. • Self-management with written action plans using self-monitoring, regular review or optimal self-management • Self-management by PEF monitoring compared with symptom monitoring	Asthma	Self care, self monitor*, self manag*, action plan*, educat* MEDLINE SHs: self care, patient education EMBASE SHs: patient education, health education CINAHL SHs: self care, self administration, self medication, self-management, self care skills	• Searched 9 bibliographic and 4 review databases, large number of websites, 4 health library catalogues • Selection criteria related to language (English, French, German), date (1998+), patients, disease, designs/quality (RCTs, $N > 30$, no major methodological problems), outcomes (health, resource use), publication type (not letters, narrative reviews, editorials, comments) • Quality score (1++, 1+, 1–) assigned using SIGN RCT checklist • Studies assessed by single reviewer	Reports: • Study characteristics: design, quality rating, setting • Intervention: type, description, comparison, educator, setting, duration/follow-up period • Patients: inclusion/exclusion criteria, sample size • Outcomes: measures, results with *p* and number-needed-to-treat estimates • Comments: demographics, completeness of follow-up, methodological issues	281 studies identified, of which 39 relevant, 18 included • No studies assigned highest quality score • Individual study results summarised in tables only, not qualitatively or quantitatively synthesised • Interventions appear to have positive impact on one or more outcomes at some time points in all but 3 studies • Focus of review seems to follow from Gibson *et al*. Cochrane reviews to identify whether recent evidence suggests the need for updating local guidelines

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Devine, 1996[83]	Adults with asthma	Psycho-educational care: education, behavioural skill development (e.g. muscle relaxation, biofeedback, hypnosis, systematic desensitisation), cognitive therapy (e.g. problem solving), non-behavioural support counselling	Asthma	Patient/client education, counselling, behavioural therapy, pulmonary rehabilitation, relaxation therapy	• Searched 4 databases, dissertations, conference proceedings and ref. lists • Selection criteria related to intervention, patients, design (experimental, quasi-experimental, pre-post), sample size (>5 per group), common source of patients in each group, disease-specific outcomes (not cognitive knowledge) • Random sample of studies subjected to dual data extraction with inter-rater reliability reported, undertaken with some blinding to effects	• Study characteristics: date, author's profession, random allocation, control group type • Sample characteristics: socio-demographics, time since diagnosis • Intervention: content, duration, timing, frequency, mode of delivery • Setting: country, site • Outcomes: measures, sample size, direction and magnitude of effect	• Overall search results not described but 31 studies of 34 interventions included, of which 58% had random allocation, 77% a control group • MAs providing pooled SMDs showed significant effects on asthma episodes (11 studies, 0.56), pulmonary function (FEV_1/FVC 10 studies, 0.34; PEF 6 studies, 0.29), functional status (4 studies, 0.46), compliance (7 studies, 0.78), healthcare use (10 studies, 0.29), use of reliever medication (8 studies, 0.62), psychological status (6 studies, 0.53), knowledge of psychomotor skills (4 studies, 1.02) • Fail-safe *N*s suggest little threat to validity of results from publication bias. Results similar when confined to RCTs only • Education alone (effect size >0.35 on 8 of 9 outcomes), and possibly behavioural therapy e.g. relaxation (effect size >0.35 on 4 of 9 outcomes) had largest effects but small number of studies of each

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Fleming *et al*. 2003 (Cochrane Protocol)[112]	Adults (aged 16+ years) with diagnosis of asthma from physician/ according to international criteria	Psychotherapeutic interventions: behavioural therapies, cognitive therapies, cognitive–behavioural therapies, relaxation therapy (with or without biofeedback and including autogenic training, certain forms of hypnosis), supportive counselling, hypnosis, education where part of complex psychotherapeutic intervention	Asthma* Wheez*	Psychotherap*, Group psychotherap*, psychol*, SH: psychotherapy	• Searched Cochrane Airways register, Cochrane CENTRAL, PsycINFO, ref. lists and contacted authors • Selection criteria related to patients, intervention, outcomes (symptoms, medication use, lung function, immune function, health service use, knowledge, psychological outcomes, behaviour, absenteeism), study type (RCT) • Criteria assessed by two reviewers with disagreements resolved by discussion • Quality assessed using Cochrane system and modified Jadad scale • Data extraction not described	Not reported	Not yet available

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Gibson *et al.*, 2003 (Cochrane review)[110]	Adults (aged 16 years) with asthma defined by doctor's diagnosis or objective criteria	• Limited (information only) education: aimed at promoting increase in knowledge which could be interactive, non-interactive or a combination • Excludes interventions included in Gibson *et al.*, 2003[72]	Asthma, wheez*	Education*, self management, self-management	• Searched Cochrane Airways register, ref. lists and contacted authors • Selection criteria related to patients, intervention, outcomes (healthcare use, lung function, medication use, absenteeism, restricted activity, symptoms, perceived disability, knowledge) study design (RCTs, CCTs) • Criteria assessed by two reviewers, with disagreements resolved by discussion • Quality assessed using Cochrane system	Study, methods, participants (sample size, demographics, socio-economics, severity), interventions (control type, type, setting, duration), outcomes (final and intermediate), quality	• 156 studies identified, of which 52 potentially relevant, 11 finally selected. All stated as randomised but methods for this unclear • Qualitative syntheses and MAs demonstrated effects of limited education in single studies on perceived symptoms (OR = 0.4), and emergency visits amongst patients with high attendance but no clear effects on other healthcare use, medication use, days lost from activity, lung function or knowledge

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Gibson *et al.*, 2003 (Cochrane Review)[72]	Adults (aged 16+ years) with asthma defined by doctor's diagnosis or objective criteria	• Self-management education: interventions supporting Australian Guidelines recommendation to 'educate and review regularly' • Includes: patient education, PEF/symptom self-monitoring, regular review, written action plan	Asthma, wheeze	Education*, self management, self-management	• Searched Cochrane Airways register, ref. lists and contacted authors • Selection criteria related to patients, intervention, outcomes (healthcare use, lung function, medication use, absenteeism, symptoms, QoL), study design (RCTs) • Criteria assessed by two reviewers, with disagreements resolved by discussion • Quality assessed using Cochrane system	Study, methods, participants (sample size, demographics, socio-economics, severity), interventions (control type, type, setting, duration), outcomes (final and intermediate), quality	• 101 papers identified of which 87 potentially relevant, 46 finally selected which reported on 36 RCTs • MAs providing pooled RRs demonstrated effects on hospitalisations (12 studies, 0.64), emergency hospital attendances (13 studies, 0.82), unscheduled doctor visits (7 studies, 0.68), absenteeism (7 studies, 0.79), nocturnal asthma (5 studies, 0.67) and QoL (SMD = 0.29), with mixed results in relation to lung function • There was significant heterogeneity in a number of outcomes and some differences between effects when binary and continuous data were examined • The greatest effects were seen in interventions including a written action plan, self-monitoring and regular review

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Powell and Gibson, 2003 (Cochrane review)[111]	Adults (aged 16 years) with asthma defined by doctor's diagnosis, objective criteria or according to ATS guidelines	Asthma self-management education programmes categorised according to whether or not they involved a written action plan, regular medical review, self-monitoring of PEF/symptoms and/or education (with optimal interventions including all these components)	Asthma, wheez*	Education, self management, self-management	• Searched Cochrane Airways register, ref. lists • Selection criteria related to patients, intervention, outcomes (healthcare use, lung function, medication use, absenteeism, symptoms, QoL), comparisons (2 or more self-management education interventions), study design (RCTs) • Criteria assessed by two reviewers, with disagreements resolved by discussion • Quality assessed using Cochrane system	Study, methods, participants (sample size, demographics, socio-economics, severity), interventions (type, setting, duration), outcomes (final and intermediate), quality	• 101 papers identified of which 87 potentially relevant, 19 finally selected which reported on 15 RCTs comparing 2 or more self-management interventions • Comparisons were made between optimal self-management vs regular review (6 studies), PEF vs symptom self-monitoring (6 studies) and optimal self-management vs modified optimal self-management (3 studies) • Qualitative syntheses and limited MAs suggested that self-management options involving adjustment of medications by medical review compared with self-adjustment of medication and self-monitoring based on PEF or symptoms were largely equivalent in terms of their impact on health outcomes • Inclusion of regular review and more intensive education led to better outcomes in 2 individual studies that compared these options but there appeared to be no difference between a verbal vs written action plan in one other study

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Sudre *et al.*, 1999[109]	Adults with asthma	Patient education programmes	Asthma	Education, training, self management	• Searched 5 databases • Selection criteria not described but studies excluded on basis of age (exclusively <18 years), intervention, language (not English, French, Dutch, German) • Data extraction by two reviewers with checking by a third and discussion over disagreements	Study (design, setting, year, country), duration of follow-up, project planning (theoretical framework, objectives, needs assessment), education (methods, setting, duration, intensity, educator, teaching tools, content)	• 2528 studies and 110 dissertations identified, 633 possibly relevant studies reduced to 94 studies related to 77 projects. 24 observational, 13 CCTs, 42 RCTs • Majority did not specify objectives or theory base and details of intervention (direction, no. of sessions, delivery methods, provider) were lacking in significant minority of studies • There were wide variations in training methods and content reported
Van der Palen *et al.*, 1998[107]	Adult asthmatics	Self-management programmes incorporating self-treatment guidelines for adjustment of medication	Asthma	Self-care, self-administration, self-medication, patient education	• Searched MEDLINE • Formal review methods not described but selection related to patients, intervention and language (English only) and some aspects of quality reported	Reports study characteristics related to relevance (behavioural approach, behaviour evaluated, follow-up, representativeness of sample, use of ICS), validity (randomisation, control group, blinding), power (sample size, homogeneity of groups, potential for improvement, stability of patients), type of guidelines (PEF, symptoms), PEF zones, action	• 273 papers identified of which 31 screened, 16 selected reporting on 15 studies • Characteristics of studies and results are described but not formally synthesised • Concludes that several studies showed improvements in health outcomes (lung function, QoL, health service use, symptoms) but the only two placebo-controlled studies showed little or no effect • Identifies that none of the interventions were explicitly based on behavioural principles and only 8 evaluated behaviour change. Many were also deficient in relation to other characteristics important to ensuring their relevance, validity and power

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Wells *et al.*, 2003 (Cochrane Protocol)[113]	Adults (aged 17+ years) who have attended the emergency room for an asthma exacerbation defined by doctor's diagnosis or objective criteria	Asthma education including information, counselling, change in therapy, peak flow/symptom monitoring and/or use of a written action plan	Asthma, wheez*	Educat*, self-manag*, self manag*	• Searched Cochrane Airways register, ref. lists, contacted authors and experts • Selection related to design (RCTs), patients, intervention, timing of intervention (within 1 week of attendance), outcomes (healthcare use, lung function, use of medications, symptoms, QoL, absenteeism), cost • Criteria assessed by 2 reviewers with disagreements resolved by consensus or a third reviewer • Quality assessed using Cochrane system and Jadad scale • Data extraction by 2 reviewers	Methods, participants (socio-demographics/ socio-economics, severity, no. of prior emergency visits, prior education) interventions (type, educator, content, recipient, time after emergency visit, control, setting, duration), outcomes (health, intermediate, cost), quality (follow-up, ITT analysis, sample size)	Not yet available
Wolf *et al.*, 2003 (Cochrane Protocol)[114]	Adults with asthma (18+ years)	Educational interventions designed to teach management strategies related to prevention, attack management or social skills	Asthma*, wheez*, bronchial NEAR hyper-reactiv* OR hyper-eactiv*	Education* Self management, self-management	• Searched Cochrane Airways register, PsycLIT, ref. lists • Selection criteria related to patients, intervention, outcomes (functional status, healthcare use, physiological status, side-effects, attainment of personal goals), study type (RCT, CCT) • Criteria assessed by two reviewers with disagreements resolved by consensus • Quality assessed using Cochrane system • Data extracted by two coders	Study (date, country, design, unit of randomisation), methods, participants (demographics, number, inclusion criteria, severity), interventions (type, duration, setting, target, type of management strategy, mode of delivery), outcomes, notes, allocation concealment	Not yet available

Reviews of multifaceted and related interventions (i.e. with psycho-educational components) in asthma

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Butz *et al.*, 1994[116]	Inner-city, disadvant-aged children with asthma	Community-based asthma management programmes which commonly include optimal clinical care through individualised plans, parent and patient education, attempts to reduce barriers to adherence	Not stated	Not stated	• No formal searching or review methods described • Selected studies for review on basis of recruitment and/or administration of intervention being in community or at community sites, interventions including basic self-management education, and studies focussing on inner-city disadvantaged children	Reports location, patient age and selection, description of intervention, results	• Reviews 5 studies meeting selection criteria • Identified key components of all interventions (including professional education) and key problems facing target group (e.g. under-treatment, medication use in conflict with guidelines, environmental triggers in homes, lack of access to care) that needed to be addressed • All studies appeared to show positive effects on at least some outcomes but formal conclusions regarding effectiveness in light of study quality are not drawn
Eastwood and Sheldon, 1996[115]	Patients with asthma	Organisational methods of asthma management: ED patient and professional education, inpatient specialist (vs generalist) care, self-admission scheme, outpatient provision in community/hospital, community-based provision (community nurses, outreach, school-based intervention, community health workers), general practice clinics and consultations and integrated/shared care	Asthma	Nursing ADJ clinic, asthma ADJ clinic, centre OR center, general ADJ practice, family ADJ practice, asthma AND setting. SHs: delivery of care, ambulatory care, ambulatory care facilities, outpatients, specialties, nursing, primary healthcare, continuity of patient care, home care services	• Searched 2 medical and 4 policy databases, made direct contact with guidelines working party members • Formal selection criteria not described but studies of relevant interventions, in English, of any design included • Studies graded according to design • Details of selection, quality assessment and data extraction procedures lacking	Reports study population, setting, study design and size, intervention, outcomes measured and follow-up, results, comments	• 9 RCTs, 4 CCTs, 14 observational studies identified • No MA conducted • Many types of care assessed with studies of mixed designs with conflicting results • Concludes that good-quality evidence to recommend any particular organisational form lacking, but specialist care may be better than general care and shared care as effective as hospital-led care

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Ernst, 2000[119]	Patients with asthma	Breathing techniques	Asthma	Breathing techniques, breathing exercises, yoga, Buteyko, physiotherapy	• Searched 4 medical databases, ref. lists, contacted experts • Selection criteria related to patients, interventions and design (RCTs only), with no language restrictions • Formal assessment and review procedures not described	Reports design, subjects, description of sample, interventions, end-points, results	• Overall search results not described but 6 RCTs are reviewed • MAs planned but not possible owing to heterogeneity of data • 4 of 6 studies demonstrated non-significant effects of breathing techniques • Author concludes on basis of 1 study that severe cases of acute asthma may not benefit from physiotherapeutic breathing techniques, on basis of 4 studies that there are insufficient data for firm conclusions regarding yoga breathing techniques and on basis of 2 studies that physiotherapeutic breathing techniques may offer some benefit for mild-to-moderate asthma although the quality and size of studies in this area are inadequate
Fay *et al*., 2003 (Cochrane review)[120]	Patients with asthma	Primary care-based asthma clinics offering a pro-active system of care/shared care (usually, nurse led, doctor supported and involving organised recall and educational input)	Not stated	Clinic*, general pract*, family pract*, primary care	• Searched Cochrane Airways register, Cochrane CENTRAL, 3 medical databases, ref. lists and contacted authors • Selection criteria related to patients, study design (RCTs), intervention, outcomes (healthcare use, absenteeism, patient satisfaction, lung function) • Criteria assessed by two reviewers, with reference to a third to resolve disagreements • Quality assessed using Cochrane system and Jadad scale	Reports study, methods, participants, interventions, outcomes, notes, allocation concealment	• One RCT included from 23 studies identified • Study had low quality score • Study showed primary care-based clinic reduced waking at night (RR = 0.30), increased provision of peak flow meters (RR = 1.30) but had no effects on 9 other outcomes • Conclusions stressed the need for more good quality trials in this area

continued

Authors	Patients	Intervention description	Search terms: Asthma	Search terms: Intervention	Methods	Data extracted	Results and conclusions
Holloway and Ram, 2003 (Cochrane review)[118]	Patients of any age with diagnosis of asthma from physician or according to international criteria	Breathing retraining/therapy (multiple interventions with breathing as major component)	Not stated	Breathing exercises, breathing-retraining, breathing training, breathing re-education, physiotherapy, physical therapy, respiratory therapy, Buteyko	• Searched Cochrane Airways register, plus 6 complementary therapy medicine and physio databases, handsearched 1 journal, contacted experts and authors • Selection criteria based on patients, interventions, outcomes (lung function, secondary outcomes), types of studies (RCTs and quasi-randomised) • Criteria assessed by 2 reviewers • Quality assessed using Cochrane approach • All disagreements resolved by discussion • Data extracted by 2 reviewers	Reports study, methods, participants, interventions, outcomes, notes	• 32 studies obtained of which 5 selected • MAs conducted although maximum of 3 studies reported each outcome so results reported for individual studies • One large study showed significant improvement in mean daily PEF and bronchodilator use, other benefits of breathing exercises shown only in isolated outcomes in single small studies • Concluded that reliable conclusions could not be drawn and there is a need for larger scale, high-quality trials
O'Brien, 1995[117]	Patients with asthma	Managed care	No formal search	No formal search	Not a formal review – discussion paper of components (physician education, co-management, patient education, cost-effectiveness, implementation) for management of asthma within managed care environment	Reports programme, developer, age group, nursing contact hours, outcome, cost savings	• Tabulates characteristics and results of 10 US-managed care programmes and limited cost-effectiveness data from 6 programmes • Results suggest that these programmes are effective and cost-effective but there are no formal syntheses of results, discussion of research quality or clear conclusions

Reviews of psycho-educational interventions in difficult asthma and at-risk groups

Authors	Patients	Intervention description	Search terms		Methods	Data extracted	Results and conclusions
			Asthma	Intervention			
FitzGerald and Turner, 1997[145]	Patients at high risk from their asthma – at risk of fatal/near-fatal asthma on basis of several characteristics	Asthma education, combined with changes in medical management	Not stated	Not stated	No formal search or review methods described – primarily a discussion paper	Reports year, country/setting, age, duration, educator, target, materials, design, comparison, number of eligible patients, number of patients enrolled, number of patients evaluated, outcomes (ED visits, hospitalisation, deaths)	• 8 studies reviewed of which 5 RCTs (3 quasi-random), 3 observational • Included patients hospitalised with severe or life-threatening attacks and emergency attenders • All described interventions combining education with changes in medical management, most were outpatient with physician primarily involved in 4, nurse alone in 3, nurse and physician in 1 • No formal qualitative or quantitative synthesis of results or firm conclusions drawn

Appendix 2

Difficult asthma terms, risk factors and indicators

List of terms used to describe patients reported to be at risk of or have outcomes associated with difficult asthma

Pathophysiological terms, risk factors and outcomes

1. **Clinical events and terms:** Fatal asthma, asthma mortality, asthma death, near-fatal asthma, near-miss asthma death, life-threatening asthma, severe life-threatening asthma, potentially fatal asthma, fatality-prone asthmatic, at-risk asthmatic, status asthmaticus, pneumothorax, hypoxic seizures, asphyxia, pneumomediastinum, intubation
2. **Disease terms and characteristics:** Severe, acute severe, hyperacute, chronic severe, difficult, brittle, refractory, unstable, unpredictable, fixed, chaotic, poor outcome, poor control, difficult symptom control, persistent/daily/frequent/ongoing symptoms, severe/frequent/sudden attacks/exacerbations, asthma with hyperventilation syndrome, psychogenic breathlessness, premenstrual, nocturnal
3. **Terms relating to pulmonary function:** Small airways (especially in children), airway wall thickening, abnormal behaviour of airway smooth muscle, reduced sensitivity of the inflammatory and immune cells in the airways, lung hyperplasia/hypertrophy, lack of full/complete reversibility, high level of airway obstruction, irreversible obstruction, bronchial remodelling, hyper-responsiveness, persistent airway inflammation despite treatment, respiratory acidosis, decline in/poor lung function, decline/impairment in airflow, low/reduced PEF, wide PEF variation
4. **Pharmacology:** Glucocorticoid or steroid-dependent/resistant/insensitive, un/under-responsive, therapy-resistant, excessive/increased/overuse/continuous use of reliever inhaler or short-acting beta-agonists, under-use of anti-inflammatory medication, BTS Step 4–5 treatment, oral/high-dose inhaled steroids, nebulisers, maximal use of medications, side-effects
5. **Co-morbidities and differential diagnoses:** Incorrect/differential diagnosis, other respiratory diseases (chronic obstructive airways disease, left ventricular failure, localised obstruction, cystic fibrosis, vocal cord dysfunction, upper airway disease), under-treated asthma, unidentified exacerbating factors including allergens, occupational exposure, allergic rhinitis, nasal polyposis, postnasal drip, sinusitis, gastro-oesophageal reflux, other systemic or psychiatric disease, physical disability, other medications especially psychotropic medication, major tranquillisers

Medical management issues

1. **Therapy descriptions:** Poorly controlled, uncontrolled despite optimal management, difficult-to-treat/control/manage, poor/non-compliance/adherence, no trigger-avoidance/management, poor/inadequate treatment/therapy/supervision, inconsistent training
2. **Health service use:** Attending secondary care respiratory/specialist/asthma clinic, casualty/accident and emergency/emergency department/emergency ward/emergency room attendance, urgent care visits, frequent attendance, out-of-hours/unscheduled attendance, intensive care, hospital admission (particularly in previous year), non attendance, accessibility problems

Patient-related risk factors and outcomes

1. **Socio-demographic:** Age (adolescent, elderly), ethnicity (African-Americans, Maori, UK Asian, other ethnic minorities), smoker, rural/inner city, living alone
2. **Socio-economic:** Low socio-economic status, deprivation, poverty, homelessness, work/unemployment stress, high risk environment/occupation, housing status (damp and other allergens)
3. **Educational**: Lack of understanding, learning disabilities, language difficulties
4. **Psychosocial:** Poor/impaired/problem symptom perception (either over or under), self-denial/neglect/harm, substance abuse, high anxiety/panic–fear, fear of medication (steroids)/side-effects, family dysfunction, physical or psychological abuse, lack of social support, negative illness perceptions, emotional maladjustment to asthma, negative/significant life events, domestic stress, drug-induced impairment in concentration, psychological problems including mood disorders, depression, psychosis, inappropriate cognitions
5. **General descriptive terms:** Difficult/problem asthmatic
6. **Behavioural:** Frequent/non-attender, non-/poorly compliant, poor/inadequate self-care behaviour/skills
7. **Quality of life outcomes:** Reduced/compromised physical, social, emotional, daily functioning/ability to function, absenteeism, employment, sick benefits

Appendix 3

Search terms

MEDLINE search strategy

Asthma-related search terms

1. exp ASTHMA/
2. asthma$.ti,ab.
3. 1 OR 2

Search terms for educational interventions

4. educat$.ti,ab.
5. train$.ti,ab.
6. instruct$.ti,ab.
7. exp PATIENT EDUCATION/
8. 4 OR 5 OR 6 OR 7
9. 8 AND 3

Search terms for self-management interventions

10. self manag$.ti,ab.
11. self care.ti,ab.
12. self monitor$.ti,ab.
13. self treat$.ti,ab.
14. action plan$.ti,ab.
15. care plan$.ti,ab.
16. exp SELF CARE/
17. 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16
18. 17 AND 3

Search terms for psychosocial interventions

19. counsel$.ti,ab.
20. exp COUNSELING/
21. psychotherap$.ti,ab.
22. exp PSYCHOTHERAPY/
23. group therapy.ti,ab.
24. (psych$ adj3 (support$ or treat$ or interven$ or program$ or technique$ or manag$ or therap$ or care)).ti,ab.
25. (behav$ adj3 (support$ or treat$ or interven$ or program$ or technique$ or manag$ or therap$ or care)).ti,ab.
26. (cognit$ adj3 (support$ or treat$ or interven$ or program$ or technique$ or manag$ or therap$ or care)).ti,ab.
27. (famil$ adj3 (support$ or treat$ or interven$ or program$ or technique$ or manag$ or therap$ or care)).ti,ab.
28. (social$ adj3 (support$ or treat$ or interven$ or program$ or technique$ or manag$ or therap$ or care)).ti,ab.
29. (stress$ adj3 (support$ or treat$ or interven$ or program$ or technique$ or manag$ or therap$ or care)).ti,ab.
30. (relax$ adj3 (support$ or treat$ or interven$ or program$ or technique$ or manag$ or therap$ or care)).ti,ab.
31. hypno$.ti,ab.
32. exp HYPNOSIS/
33. psychoanalysis.ti,ab.
34. exp PSYCHOANALYSIS/
35. guided imagery.ti,ab.
36. biofeedback.ti,ab.
37. 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36
38. 37 AND 3

Search terms for multifaceted interventions

39. ((centre$ or center$) adj3 asthma$).ti,ab.
40. ((clinic or clinics) adj3 asthma$).ti,ab.
41. 40 OR 41

Combined terms

42. 9 OR 18 OR 38 OR 41

EMBASE search strategy

The EMBASE search strategy was identical to that used for MEDLINE except that the intervention subject headings terms were replaced with the following:

exp HEALTH EDUCATION/
exp SELF CARE/
exp PSYCHIATRIC TREATMENT/

CINAHL search strategy

The CINAHL search strategy was identical to that used for MEDLINE except that the intervention subject headings terms were replaced with the following:

exp PATIENT EDUCATION/
exp SELF CARE/
exp COUNSELING/
exp PSYCHOTHERAPY/

Other data sources

The search strategy for other large databases (e.g. Web of Science) was identical to that used for MEDLINE except that intervention subject heading terms were not applied.

Appendix 4

Title-only study

Abstract presented at the 11th Cochrane Colloquium

Authors: Miranda Mugford,[1] Jane Smith,[1] John Battersby,[2] Richard Holland,[1] Ian Harvey[1]
[1] School of Medicine, Health Policy and Practice, University of East Anglia
[2] Institute of Public Health, University of Cambridge

Title: The impact on two systematic reviews of study eligibility decisions related to citations lacking abstracts.

Abstract

Objective: To assess the impact of making eligibility decisions on the basis of titles only.

Methods: Two random samples of 50 citations without abstracts were taken from search results of two reviews differing in scope and complexity (in [1] heart failure and [2] asthma). Two reviewers within each review independently assessed eligibility against review-specific criteria. Inclusion/exclusion decisions were first made on the basis of titles and other citation details only, and then on retrieving full-text documents. Consensus regarding inclusion was reached where there were disagreements.

Results: Most full-text documents were able to be obtained ([1] 80%, [2] 96%) but at high cost. A majority did not report original research ([1] 90%, [2] 54%). Agreement between assessments made on the basis of titles and full text varied by review (kappa scores [1] 0.19, [2] 0.40). Totals of 8% [1] and 16% [2] of citations were initially thought eligible. Full-text assessment revealed two additional potentially relevant studies for review [1] and one for review [2].

Conclusions: Financial constraints often prevent retrieval of full-text documents for citations lacking abstracts. This study suggests that exclusion of these is unlikely to bias review conclusions, although it may lead to a small loss of data.

For a copy of the full poster presentation or further information on this exercise, please contact Jane Smith (j.r.smith@uea.ac.uk).

Appendix 5

Study classification form

Reviewer:	Date:	Study ID:	Authors:

Difficult asthma *(Tick all that apply)*	Hospitalisation ☐	Socio-economic/demographic factors (e.g. ethnicity) ☐
	Emergency services ☐	Behavioural factors/non-compliance ☐
	Medication use/steroid dependent/resistant ☐	Psychological morbidity ☐
	Symptoms/absenteeism/daily functioning ☐	Co-morbidities (physical) ☐
	Clinical evaluation/lung function/asthma status ☐	Area of residence high risk ☐
	Other (specify)	

Were difficult asthma patients a subgroup?	Yes ☐	No ☐	Unclear ☐

Study design *(Refer to algorithm)*	Qualitative ☐	Non-comparative/descriptive study ☐	Cross-sectional ☐
	Before–after/time series ☐	Retrospective observational (e.g. cohort, case–control) ☐	Prospective observational (e.g. cohort, times series + concurrent comparison) ☐
	Controlled trial ☐	Cluster randomised trial ☐	Randomised trial ☐
	Other (specify)		

Study type	Effectiveness study (i.e. no info. on costs) ☐	Cost study (i.e. no info. on effectiveness) ☐	Costs and effectiveness (details) ☐

Patient group *(Tick all that apply)*	Children ☐	Adolescent ☐	Adult ☐	Elderly ☐	Other (specify)

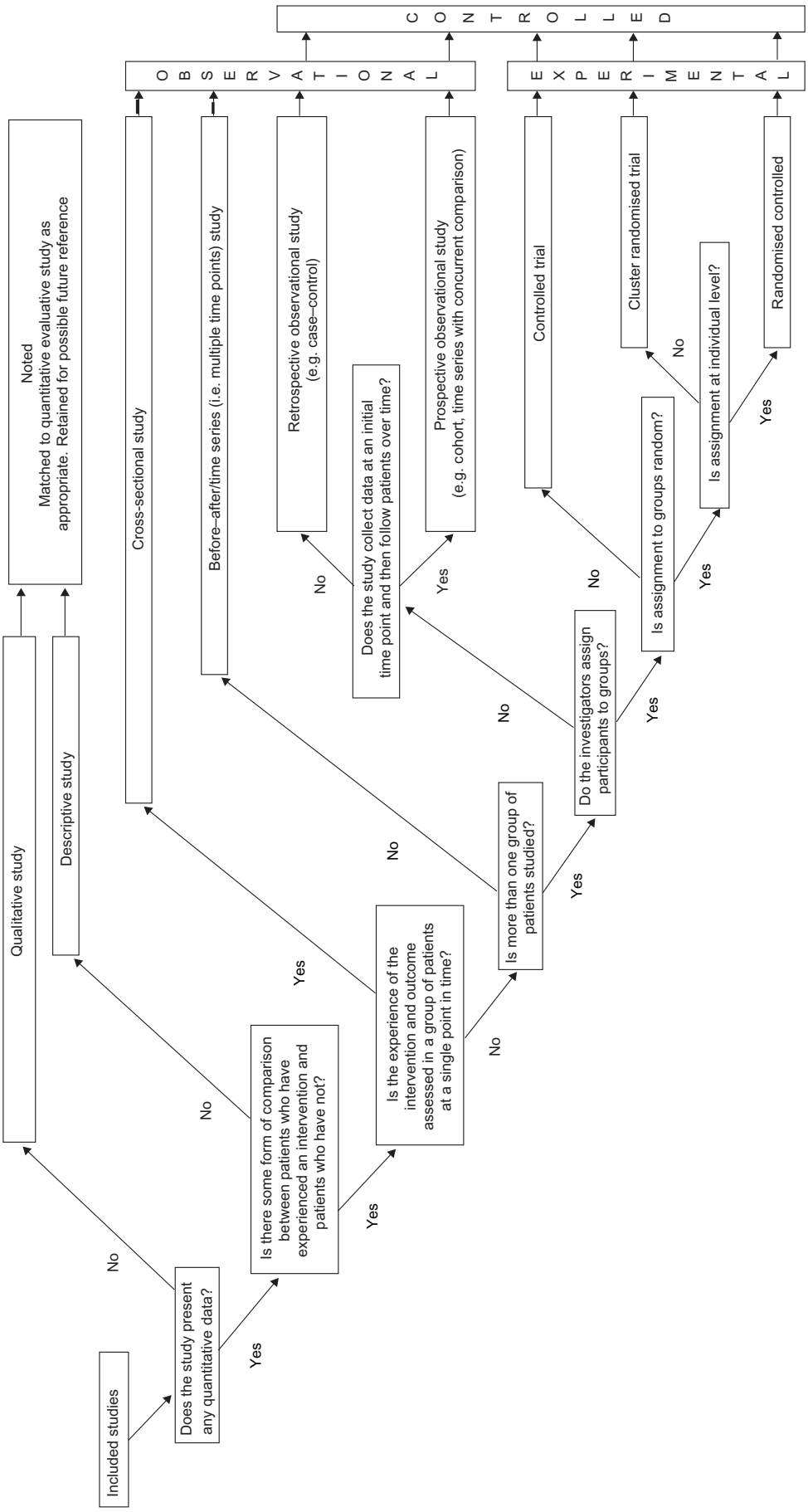
Intervention type	Education ☐	Self-management ☐	Psychotherapeutic ☐
	Social support ☐	Combination ☐	Other (specify)
Was the intervention part a larger effort?	Yes (specify) ☐	No ☐	Unclear ☐

Comparison(s) (*Tick all that apply*)	Education ☐	Self-management ☐	Psychotherapeutic ☐
	Social support ☐	Combination ☐	Minimal education ☐
	Usual care ☐	Other active non-psycho-educational treatment ☐	Placebo ☐
	Nothing ☐	Other (specify)	

Outcomes *(Tick all that apply)*	Death ☐	A&E attendance ☐	Self-care behaviour/ compliance ☐	Absenteeism ☐
	Exacerbations ☐	Admissions/ re-admissions ☐	Knowledge ☐	Health status/ QoL ☐
	Symptoms/asthma control ☐	Other unscheduled attendance ☐	Beliefs/attitudes ☐	Psychological morbidity ☐
	Respiratory function/severity ☐	Scheduled healthcare attendance ☐	Social support ☐	Costs ☐
	Medication use ☐	Other (specify)		

Appendix 6

Study design algorithm


Included studies
Does the study present any quantitative data?
No
Yes
Qualitative study
Noted
Matched to quantitative evaluative study as appropriate. Retained for possible future reference
Is there some form of comparison between patients who have experienced an intervention and patients who have not?
No
Yes
Descriptive study
Is the experience of the intervention and outcome assessed in a group of patients at a single point in time?
No
Yes
Cross-sectional study
Is more than one group of patients studied?
No
Yes
Before–after/time series (i.e. multiple time points) study
Do the investigators assign participants to groups?
No
Yes
Does the study collect data at an initial time point and then follow patients over time?
No
Yes
Retrospective observational study (e.g. case–control)
Is assignment to groups random?
No
Yes
Prospective observational study (e.g. cohort, time series with concurrent comparison)
Is assignment at individual level?
No
Yes
Controlled trial
Cluster randomised trial
Randomised controlled
OBSERVATIONAL
EXPERIMENTAL
CONTROLLED

Appendix 7

Details of included studies and accompanying data sources

Listed in alphabetical order by first author surname and year of main/most recent paper and including unique study identification number.

Study identification	Data sources/notes
170 Abramson, 1979	7 published papers[182–188]
49 Agarwal, 1999	Published paper[299]
2 Ago, 1980	Published paper[435]
107 Alexander, 1972	Published paper[363]
184 Alexander, 1972	Published paper[277]
171 Alexander, 1979	Published paper[308]
43 Alexander, 1988	Published paper[402]
130 Backman, 1981	Published paper[385]
118 Baier, 1999	Published paper[195]
188 Bailey, 2002	Abstract of research in progress,[241] conference abstract.[242] NB: Conference abstract describes implementation of intervention only. Author (Gerald) contacted, advised no published results at present but provided no further details
61 Bartlett, 2002	Published paper[236]
76 Baxmann, 1989	Published paper[289]
165 Bidat, 1998	Published news item[196]
89 Blixen, 2001	Published paper,[433] conference abstract[434]
203 Bodnar, 1990	Dissertation abstract.[194] NB: full thesis not obtained
70 Bonner, 2002	Published paper[422]
156 Bowler, 1998	Published paper[447]
106 Bratton, 2001	Published paper[280]
155 Brewin 1995	Published paper.[441] NB: Author (Brewin) contacted, provided additional details of intervention but advised no further evaluation published
198 Brown, 1997	Published news item[331]
54 Bruzzese, 2001	Published paper[237]
83 Butz, 1994	Published paper,[223] abstract of research in progress.[224] NB: No actual results reported in published paper, author (Butz) contacted and advised no further publications on same intervention, ongoing studies use different intervention using nurses
172 Calder, 2002	Conference abstract,[268] abstract of research in progress.[269] NB: Author (Douglas) contacted and advised study still in progress, no outcomes reported to date
63 Capen, 1998	2 published papers[191,192]
121 Cassidy, 1994	Published paper[197]
109 Catrambone, 2000	Dissertation abstract[386] plus full text of unpublished PhD thesis
28 Choy, 1999	Published paper[325]
138 Christiansen, 1997	Published paper[234]
169 Ciurluini, 1993	Published paper[451]
81 Clark, 1986	4 published papers,[243–246] conference abstract[247]
64 Colland, 1993	Published paper[378]
173 Collins, 1994	Published paper[407]
38 Côté, 2001	Published paper[257] and conference abstract.[258] NB: 2 published papers[458,459] and conference abstract[460] in relation to previous study excluded in own right (conducted in patients with moderate–severe asthma only) used to provide additional information on intervention
162 Couriel, 2002	Abstract of research in progress.[248] NB: Author (Couriel) contacted, provided additional information on intervention and descriptive results (but no actual data) and advised paper recently submitted for publication
36 Cowie, 1997	Published paper[259]
88 Cowie, 2002	Published paper[374]

continued

Study identification	Data sources/notes
90 Dahl, 1990	Published paper[381]
91 Davis, 1973	Published paper,[382] dissertation abstract[383] plus full text of unpublished PhD thesis
17 de Oliveira, 1999	2 published papers[252,253] and dissertation abstract[254]
15 Didier, 1999	Conference abstract.[339] NB: Author (Didier) contacted and provided additional information on intervention but advised no further data published
157 DiMango, 2002	Conference abstract.[340] NB: Author (Di Mango) contacted for further information, no response received
11 Doan, 1996	2 published papers[314,315]
93 D'Souza, 1996	Published paper.[266] NB: Reports on different sample to D'Souza (2000) papers
35 D'Souza, 2000	6 published papers[343–348] and conference abstract.[349] NB: All papers report on different outcomes/time points (up to 6 years of follow-up) for same study. Additional D'Souza (1996) study reports on different sample
7 Ebana, 1994	Published paper[354]
129 Einhorn, 2000	Published paper[212]
174 Eis, 1997	Published news item[211]
168 Ernst, 1998	Published news item.[274] NB: Author (Ernst) contacted and provided additional unpublished abstract
51 Evans, 1987	Published paper[403]
133 Fedotov, 1996	Conference abstract.[217] NB: Author (Fedotov) contacted, provided additional information on patients and reference to further conference abstract which was not able to be obtained
120 Feeny, 1999	Published paper[205]
191 Feldman, 1976	Published paper[309]
131 Fisher, 1996	2 published papers.[408,409] NB: No actual results reported in published papers. Author (Fisher) contacted and provided reference to additional conference abstract and unpublished manuscript
143 Fitzpatrick, 1982	Published paper[290]
59 Fitzpatrick, 1992	1 published paper[238]
132 Ford, 1996	Published paper[260]
14 Ford, 1997	Published paper.[432] NB: Ford paper presents subgroup effectiveness analysis for previous trial conducted by Bolton. Paper[474] and conference abstract[475] excluded in own right which reported on this used to provide additional information on study. Cost information only provided in conference abstract for whole sample.
12 Forshee, 1998	Published paper[316]
98 Forth, 1976	Published paper[214]
163 Franceschi Dusi, 1985	Published paper[326]
100 Fritz, 1981	Published paper[202]
147 Gallivan, 1998	Published paper[271]
45 Garrett, 1994	Published paper[404]
148 Garvey, 2002	Conference abstract.[362] NB: Author (Garvey) contacted and provided brief unpublished manuscript
21 George, 1999	Published paper[437]
187 Ghosh, 1998	Published paper[261]
25 Gibson, 1995	Conference abstract.[457] NB: Author (Gibson) contacted and advised no further data published
72 Godding, 1997	Published paper[278]
96 Gold, 1986	Dissertation abstract[418] plus full text of unpublished PhD thesis
195 Gorham, 1996	Conference abstract[201] could not be obtained, details based on limited information obtained from website
175 Greene, 1999	Published paper[219]
71 Greineder, 1999	2 published papers[387,388] and conference abstract.[389] NB: Greineder (1995)[388] reports on separate sample but is before-and-after study of same intervention so not considered separately
167 Griffiths, 2002	3 conference abstracts[390,391,393] and abstract of research in progress.[392] NB: Author (Griffiths) contacted and provided unpublished manuscript which was subsequently published after completion of review.[505] No data available to date on planned economic evaluation
3 Groen, 1960	Published paper[436]
119 Guadano, 1995	Published paper[300]
75 Gustafsson, 1988	2 published papers[419,420]
41 Hanson, 1998	Published paper,[394] conference abstract[395] and abstract of research in progress.[396] NB: Principal investigator (Murphy) contacted for further information but no reply received
67 Harish, 2001	Published paper[423]

continued

Study identification	Data sources/notes
26 Hashizume, 1996	Published paper[357]
60 Hendricson, 1996	Published paper[206]
190 Hicks, 1994	Published news item[222]
44 Higgins, 1998	Published paper[281] and conference abstract[282]
101 Hill, 1997	Published news item[207]
74 Hochstadt, 1980	Published paper[291] and published news item[292]
102 Horst, 1995	Published paper[208]
192 Johnson, 2002	2 conference abstracts.[225,226] NB: Study recently completed, author not able to be contacted prior to completion of review
149 Jones, 1987	Published paper[273]
22 Jowers, 2000	3 published papers[332,334,335] and published news item.[333] NB: Paper on previous study excluded in own right (describing programme provided to all asthma patients) used to provide additional information on intervention[463]
103 Kaelin, 2002	Published paper[193]
42 Kelly, 1998	Published paper[301]
84 Kelly, 2000	Published paper[379] and conference abstract[380]
127 Kelso, 1995	Published paper.[431] NB: Author (Kelso) contacted and advised 1995 and 1996 papers report on separate studies with differences in results due to 1995 sample being more difficult patient group
18 Kelso, 1996	Published paper.[430] NB: Author (Kelso) contacted and advised 1995 and 1996 papers report on separate studies with differences in results due to 1995 sample being more difficult patient group
186 Kennerly, 1997	Published paper.[336] NB: Includes subgroup analysis of highest service users but numbers in groups not provided
9 Kihara, 1992	Published paper[355]
193 Kirk, 2001	3 conference abstracts.[426–428] NB: Author (Kirk) contacted but no further information received. Kirk (2001) abstract[425] reports on retrospective study of large sample with control group, other abstracts report on before-and-after study of subgroup of same patients; only 2000 abstract[427] provides limited data on costs
124 Krieger, 2002	Published paper.[405] NB: Paper in relation to previous study excluded in own right (no intervention) used to provide additional information on patients[471]
105 Kropfelder, 1996	Published paper[203]
150 Leshchenko, 1999	Published paper[341]
153 Levenson, 1997	Published paper[317]
34 Levy, 2000	Published paper[262]
176 Lewis, 1994	2 published papers.[424,425] NB: Author (Lewis) contacted and confirmed 1996 paper reported separate study and earlier papers[472,473] excluded in own right (targeted general asthma sample) provided additional information on intervention
62 Lewis, 1996	Published paper.[239] NB: Author (Lewis) confirmed separate from Lewis (1994) study
140 Liebman, 1974	Published paper[189] and book chapter[190] which could not be obtained
137 Lincoln, 1993	Published news item[209]
56 Liu, 2001	Published paper[227]
139 Lurie, 2001	Published paper[240]
77 Madge, 1997	Published paper[411]
194 Madge, 2002	Abstract of research in progress.[375] NB: Author contacted and advised study recently completed, currently being written up but provided no further details. Data extraction therefore based on abstract and additional information from website
16 Maiman, 1979	Published paper[255]
52 Malik, 2002	Published paper.[302] NB: Short report only
29 Maljanian, 1999	2 published papers[358,359] and 2 published news items[360–361]
1 Manocha, 2002	Published paper[448]
68 Marosi, 2001	Published paper[296]
177 Martin, 1997	Published news item.[218] NB: Reports on planned programme, no data reported
125 Martinez-Donate, 2002	Published paper[313] and conference abstract.[312] NB: Author (Meltzer) contacted and provided additional reference to linked paper[462] excluded in own right (environmental intervention conducted within subsample receiving broader programme) which was used to provide additional descriptive data
92 Mayo, 1990	Published paper[429]
5 McAdam, 2000	Published paper[215]

continued

Study identification	Data sources/notes
23 McDonald, 2002	Conference abstract.[337] NB: Author (McDonald) contacted, provided additional information on intervention and patients but advised no further data reported elsewhere
57 McElmurry, 1999	Published paper[210]
48 McNabb, 1985	Published paper,[412] dissertation abstract[413] plus full text of PhD thesis and 2 conference abstracts.[414–415] NB: Bagshaw abstract reports one extra study participant but appears to be same study in all other respects
94 Mildenhall, 1998	2 conference abstracts[438,439] NB: Conference abstracts report on small pilot study. Author contacted and provided unpublished project report for recently completed full RCT
116 Mitchell, 1986	Published paper[376]
115 Mitchell, 2000	Published paper[216]
30 Morice, 2001	Published paper[442] and conference abstract[443]
4 Morrison, 1988	Published paper[327]
27 Moudgil, 2000	Published paper[267]
20 Murphy, 1995	Published paper[318]
126 Nagata, 1995	Published paper.[328] NB: Reports on adapted version of psychosomatic treatment evaluated in Ago (1980) study[435]
33 Nahri, 2002	3 published papers[350–352]
160 Niquet, 1996	Published news item[220]
151 Oldam, 1997	Published paper[270]
185 O'Neill, 2001	2 published papers.[283,284] NB: Author (Lowe) contacted, provided reference to 2002 article and advised long-term study just set up
154 Onnis, 1993	Published paper[293]
85 Osman, 2002	Published paper[444] and abstract of research in progress[445]
128 Park, 1996	Published paper[310]
87 Parry, 2002	2 abstracts of research in progress.[449,450] NB: Author (Parry) contacted and provided additional unpublished abstract plus slides from presentation to Psychosocial Research in Asthma Group on recently completed RCT. No data available to date on planned economic evaluation
13 Pauley, 1995	Published paper[342]
37 Perneger, 2002	Published paper[263]
73 Piazza, 1981	Published paper[279]
159 Poon, 2002	Conference abstract[256]
47 Reid, 2000	Dissertation abstract[303] plus full text of unpublished thesis
40 Richards, 1981	Published paper[275]
117 Robinson, 1985	Published paper[304] and conference abstract[305]
197 Robinson, 2000	2 conference abstracts[285,286]
50 Ronchetti, 1997	Published paper[416]
196 Roque, 1999	Published paper[272]
152 Ross, 2002	Conference abstract.[452] NB: Author (Ross) contacted and advised study in process of being written up but did not provide further details, therefore data extraction based on abstract only
164 Rowe, 1999	Conference abstract.[198] NB: Author (Bowen) contacted and advised no further publications as study discontinued owing to difficulties with recruitment and engagement
82 Schneider, 1997	Published paper[228]
24 Self, 1994	Published paper[338]
122 Sheikh, 1997	Published paper[276]
66 Sherman, 2001	Published paper[297]
55 Shields, 1990	Published paper.[377] NB: Additional abstracts[464–467] excluded in own right (not difficult asthma) used to provide further information on intervention
134 Smith, 1997	Published paper[199]
178 Spaulding, 2001	Dissertation abstract[311] plus full text of unpublished PhD thesis
123 Stanford, 1996	Published news item[213]
189 Steel, 2002	Abstract of research in progress[264] and published news item.[265] NB: Author (Steel) contacted and advised RCT stopped owing to recruitment problems, additional funding being sought to continue
136 Stevens, 2002	Published paper[249] and abstract of research in progress[250]
65 Stout, 1998	Published paper[298]
86 Sullivan, 2002	3 published papers,[397–399] published news item[400] and conference abstract.[401] NB: 3 papers[468–470] in relation to previous studies excluded in own right (no intervention) used to provide additional information on patients

continued

Study identification	Data sources/notes
179 Taggart, 1984	Conference abstract.[235] NB: Author (Taggart) contacted and advised distinct from Taggart (1991) study[306]
78 Taggart, 1991	Published paper.[306] NB: Author (Taggart) contacted and advised distinct from Taggart (1984) study[235]
58 Talabere, 1991	Dissertation abstract[229] plus full text of unpublished PhD thesis, book chapter[230] and published paper[231]
6 Teshima, 1991	Published paper[329]
19 Trautner, 1993	3 published papers[319–321] and conference abstract[322]
201 Vargas, 2002	Conference abstract.[251] NB: Author (Vargas) contacted and advised data collection still in progress, additional descriptive information obtained from website
53 Vazquez, 1993	Published paper.[406] NB: Relevant subgroup analysis includes patients from only 1 of 2 intervention groups compared with control
181 Villenueva, 2000	2 conference abstracts[323,324]
80 Volsko, 1998	Published paper[307]
135 Watson. 2000	2 conference abstracts.[232,233] NB: Author (Becker) contacted and advised still being written up but provided no further information.
158 Weder, 1994	Conference abstract.[384] NB: Author (Weder) contacted and provided additional related publication but this did not report on intervention study, data extraction therefore based on abstract only
95 Weinstein, 1998	6 published papers[365–368,371,372] and 4 conference abstracts.[364,369,370,373] NB: Only Weinstein (1998) abstract[364] compares 2 groups (inpatient vs outpatient rehab.), all others report on before-and-after study of inpatient rehab. where there seems to be considerable overlap pf samples, probably with different subgroups in each study
199 Weisberg, 1995	Conference abstract.[287] NB: Additional report[461] excluded in own right (not primary research) used to provide additional information on intervention
79 Wesseldine, 1999	Published paper[417]
142 Westphal, 1984	Published paper.[410] NB: Full article could not be obtained (incorrect citation) and author could not be traced, therefore data extraction based on translation of abstract only
141 White, 1961	Published paper[330]
200 White, 2001	2 conference abstracts[453,454] and 2 abstracts of research in progress.[455,456] NB: Author (White) contacted, advised study still being written up but did not provide further information. No data on economic evaluation available to date
145 Wilkening, 1999	Conference abstract.[421] NB: RCT design reported in translated abstract but no actual results data presented
46 Williams, 1982	Published paper[288]
183 Wilson, 1998	Published paper.[221] NB: Author (Wilson) contacted and advised no formal evaluation conducted or further papers published
202 Wright, 1999	Published paper[200]
97 Yamanaka, 1980	Published paper[356]
32 Yoon, 1993	Published paper.[446] NB: Additional paper[53] excluded in own right (no intervention) used to provide further information on patients
69 Yoos, 1997	Published paper[204]
182 Zeltzer, 1980	2 conference abstracts[294,295]
31 Zimmer, 2000	Published paper[353]
108 Zimmermann, 2000	Conference abstract.[440] Author (Crocker) contacted, provided further unpublished abstract and advised RCT results soon to appear in *Am J Respir Crit Care Med*, paper subsequently published following completion of review[527]

Appendix 8

Studies for which eligibility status could not be determined

Study	Details of patients	Details of intervention	Notes
Aihara, 1995[476]	Children with severe asthma	'Certificate of merit therapy' (psychotherapy included as keyword)	No abstract. Japanese journal article could not be obtained to confirm whether psycho-educational intervention
Anon., 1996[477]	No indication of patients targeted	'Asthma center … education, phone support'	No abstract. US magazine article could not be obtained to confirm whether targeted difficult asthma
Anon., 1996[478]	ED attenders (revisits reduced)	Asthma education	Short abstract. US magazine article could not be obtained to confirm whether targeted difficult asthma or education interactive
Anon., 1997[479]	Children but no further indication of patients targeted	Education programme	No abstract. US magazine article could not be obtained to confirm whether targeted difficult asthma or education interactive
Anon., 2002[480]	Medicaid patients	Asthma case management/disease management programme	Short abstract. US magazine article could not be obtained to confirm whether primary research or psycho-educational intervention
Blake, 2002[481]	Frequent attenders	Nurse-run clinics	NRR abstract. Author contacted to determine whether psycho-educational intervention, no response received
Deenen, 1996[482]	Severe asthma and COPD patients (no details on proportions)	Medico-psychological intervention	No abstract. Dutch university report could not be obtained to determine whether separate analysis of asthma patients
Doyle, 2002[483]	Children attending A&E but not admitted	Early follow-up and review by nurse clinician	NRR abstract. Author responded to contact, confirmed study still being written up but no further details provided to confirm whether psycho-educational intervention
Fauquert, 1997[484]	Children who had required hospitalisation for severe asthma attack in past 3 years	Standardised method of education	French abstract. Full article from French journal could not be obtained to determine whether psycho-educational intervention
Fukui, 1989[485]	Children undergoing long-term hospitalisation for asthma	Overnight education and training session	No abstract. Japanese journal article could not be obtained to determine whether psycho-educational intervention
Furumoto, 1992[486]	Probably hospitalised	Group education hospitalisation system	No abstract. Japanese journal article could not be obtained to determine whether psycho-educational intervention
LeBailly, 1998[487]	Children previously hospitalised	Peer health education	Conference presentation. Conference organisers contacted for copy of abstract but no response received so could not determine whether psycho-educational intervention

continued

Study	Details of patients	Details of intervention	Notes
Maggio, 1998,[488] 1996[489]	Presumably children but no further indication of patients targeted	School-based health education, 'asthma warriors'	No abstract. Newsletter article and meeting abstract could not be obtained, author contacted but did not respond so could not determine whether targeted difficult asthma
Mimura, 1997[490]	No indication of patients targeted	Group educational hospitalisation	No abstract. Japanese journal article could not be obtained to determine whether targeted difficult asthma or psycho-educational intervention
Monroe, 1996[491]	No indication of patients targeted	Community health and peer educators providing community-based education	Conference presentation. Conference organisers contacted for copy of abstract but no response received so could not determine whether targeted difficult asthma or psycho-educational intervention
Nemoto, 1985[492]	Children but no further indication of patients targeted although likely hospitalised/severe given intervention	Long-term institutional therapy (education, psychotherapy are keywords)	No abstract. Japanese journal article could not be obtained to determine whether targeted difficult asthma or psycho-educational intervention
Nichols, 1999[493]	Adults at high risk of adverse outcomes (ED visits, admissions, uncontrolled symptoms)	Multidisciplinary asthma clinic including education and skills training	Conference abstract only. Author contacted but no response received to confirm whether education interactive
Prabhakara, 1996[494]	Children but no further indication of patients targeted	Home-bound asthma education	Conference abstract could not be obtained to confirm whether targeted difficult asthma or psycho-educational intervention
Ross, 1998[495]	Patients previously hospitalised	Disease management programme	No abstract. US magazine article could not be obtained from UK sources to confirm whether psycho-educational intervention
Rynes, 1999[496]	Children residing in rural area	Asthma education programme	Conference abstract could not be obtained to confirm whether targeted difficult asthma or psycho-educational intervention
Schull, 2002[497]	Moderately severe to severe high-risk patients	Education and training individualised to needs using database of objectives, methods, barriers and receptiveness	Conference abstract. Author contacted for further information but no reply received to confirm whether psycho-educational intervention
Shimokamo, 1995[498]	Children who had difficulty in school life due to asthma attacks	Asthma summer school (education and psychotherapy are included as keywords)	Short abstract. Japanese journal article could not be obtained to determine whether psycho-educational intervention
Strunk, 1989[499]	Severe, poorly controlled asthma and significant psychological problems	Long-term hospitalisation	Full article retrieved but no details provided on intervention to determine whether psycho-educational component

continued

Study	Details of patients	Details of intervention	Notes
Toyoshima, 1997[500]	Asthmatic children	Psychosomatic medical treatment	No abstract. Japanese journal article could not be obtained to determine whether targeted difficult asthma or psycho-educational intervention
Tsubaki, 1992[501]	Children with long-term hospitalisation for asthma	Self-management	No abstract. Japanese journal article could not be obtained to determine whether psycho-educational intervention
Tsukane, 1971[502]	Frail children with asthma	Special educational programme	No abstract. Japanese journal article could not be obtained to determine whether targeted difficult asthma or psycho-educational intervention
Williams, 1992[503]	Incarcerated men with moderate–severe asthma (referred to as high risk)	Asthma self-management education classes on ward and in cell blocks	Conference abstract only. Could not obtain further information to determine whether educational programme interactive
Yonezawa, 1993[504]	Severe asthmatic children	Hospital therapy (psychotherapy included as keyword)	No abstract. Japanese journal article could not be obtained to determine whether psycho-educational intervention

NRR, National Research Register.

Appendix 9

Potentially relevant papers identified too late for review

Barta PJ, Carlson MJ, Ahl E. Improving care for children with asthma in two Medicaid health plans. *Journal of Clinical Outcomes Management: JCOM* 2002;**9**:557–64.

Brown JV, Bakeman R, Celano MP, Demi AS, Kobrynski L, Wilson SR. Home-based asthma education of young low-income children and their families. *J Pediatr Psychol* 2002;**27**: 677–88.

Ignacio-Garcia JM, Pinto-Tenorio M, Chocron-Giraldez MJ, Cabello-Rueda F, Lopez-Cozar Gil AI, Ignacio-Garcia JM, *et al*. Benefits at 3 yrs of an asthma education programme coupled with regular reinforcement. *Eur Respir J* 2002; **20**(5):1095–101.

Marabini A, Brugnami G, Curradi F, Casciola G, Stopponi R, Pettinari L, *et al*. Short-term effectiveness of an asthma educational program: results of a randomized controlled trial. *Respir Med* 2002;**96**:993–8.

Smith BJ, McElroy HJ, Ruffin RE, Frith PA, Heard AR, Battersby MW, *et al*. The effectiveness of coordinated care for people with chronic respiratory disease. *Med J Aust* 2002;**177**:481–5.

Appendix 10

Descriptive studies

Studies ordered by degree to which difficult asthma was targeted, type of intervention and then alphabetically by author.

Descriptive studies in children

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components
Abramson, 1979[182–188]	Definite	Hospitalisation PLUS intractable asthma	Psychosocial	Psychosomatic group therapy
Liebman, 1974[189,190]	Definite	Intractable asthma	Psychosocial	Family therapy
Capen, 1998[191,192]	Definite	NFA OR severe asthma PLUS multiple risk factors (behavioural problems, non-compliance, 3+ hospitalisations, psychiatric morbidity, oral steroids, adolescent)	Multifaceted	Education, self-management, rapid response network, environmental assessment and changes
Kaelin, 2002[193]	Definite	NFA	Multifaceted	Education, self-management, physical therapy, occupational therapy, speech therapy, pulmonary rehabilitation
Bodnar, 1990[194]	Probable	Adolescent PLUS poorly controlled asthma	Psychosocial	Family therapy with creative visualisation
Baier, 1999[195]	Possible	Area low SES and high asthma morbidity PLUS most moderate–severe asthma	Education	Education, some elements of self-management, case management
Bidat, 1998[196]	Possible	Severe asthma	Education	Education, some elements of self-management
Cassidy, 1994[197]	Possible	Severe asthma	Education	Education, residential school, medical treatment, exercise
Rowe, 1999[198]	Possible	Homeless	Education	Education, medical treatment, social support
Smith, 1997[199]	Possible	Hospitalisation	Education	Education, social support
Wright, 1999[200]	Possible	Low income, newly diagnosed	Education	Education
Gorham, 1996[201]	Possible	Ethnic minority (Latino)	Self-management	Education, self-management
Fritz, 1981[202]	Possible	Severe-end psychological morbidity	Psychosocial	Psychosomatic inpatient treatment, medical treatment, psychiatric consultation
Kropfelder, 1996[203]	Possible	Moderate–severe asthma PLUS highest users of services	Multifaceted	Education, self-management, case management
Yoos, 1997[204]	Possible	Ethnic minority PLUS most moderate–severe asthma	Multifaceted	Education, self-management, linking to health professionals
Feeny, 1999[205]	Insufficient	High-risk asthma area	Education	Education
Hendricson, 1996[206]	Insufficient	Most ethnic minority	Education	Education, some elements of self-management, use of psycho-educational theories

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components
Hill, 1997[207]	Insufficient	Ethnic minority, low SES area	Education	Education
Horst, 1995[208]	Insufficient	Low SES area	Education	Education, free or low cost medication and equipment, case management, referral
Lincoln, 1993[209]	Insufficient	Low SES area	Education	Education, some elements of self-management
McElmurry, 1999[210]	Insufficient	Ethnic minority, low SES area	Education	Education
Eis, 1997[211]	Insufficient	A&E attendance OR hospitalisation OR physician referral of at-risk	Self-management	Education, self-management
Einhorn, 2000[212]	Insufficient	Low SES area	Multifaceted	Education, self-management, medical treatment, environmental control

Descriptive studies in adults

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components
Stanford, 1996[213]	Definite	Brittle asthma	Education	Education, self-help support, liaison
Forth, 1976[214]	Probable	Psychological morbidity PLUS most severe, multiple hospitalisations	Psychosocial	Psychosomatic treatment
McAdam, 2000[215]	Probable	Psychological morbidity or psychological problems preventing good asthma control	Psychosocial	Joint medical and psychiatric consultation
Mitchell, 2000[216]	Possible	Hospitalisation	Education	Limited education in hospital
Fedotov, 1996[217]	Possible	Neurotic	Psychosocial	Biofeedback

Descriptive studies in which age group unclear

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components
Martin, 1997[218]	Probable	Severe (hospitalisation) PLUS non-compliant	Multifaceted	Education, self-management, environmental analysis
Greene, 1999[219]	Insufficient	Majority low income, ethnic minority area	Education	Education, outreach clinics, free medication/equipment for those who cannot afford it
Niquet, 1996[220]	Insufficient	Low SES living far from health centres	Education	Education, outreach
Wilson, 1998[221]	Insufficient	Highest mortality rates, low SES, ethnic minority area	Education	Education
Hicks, 1994[222]	Insufficient	Ethnic minority area	Multifaceted	Education, self-management, nurse run clinic including assessment, medical treatment

SES, socio-economic status.

Appendix 11

Studies with insufficient targeting of difficult asthma

Studies ordered by intervention type, study design and then alphabetically by author.

Studies with insufficient targeting of difficult asthma in children

Study	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Butz, 1994[223,224]	Inner city, mostly ethnic minority area	Education	Education, facilitating access to services, community health workers	RCT	A&E/ED attendance, Medication use, Respiratory function, Severity, Symptoms/asthma control	No
Johnson, 2002[225,226]	Inner city, low-income area	Education	Education, case management	RCT	Admission/readmission, A&E/ED attendance	Yes
Liu, 2001[227]	A&E attendance	Education	Education	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Severity, Exacerbations, Symptoms/asthma control, Absenteeism, Psychological morbidity, Knowledge, Beliefs/attitudes	No
Schneider, 1997[228]	Ethnic minority area	Education	Education, use of psycho-educational theories, parent visiting	RCT	Admission/readmission, A&E/ED attendance, Psychological morbidity	No
Talabere, 1991[229–231]	A&E attendance OR hospitalisation	Education	Education	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Exacerbations, Absenteeism, Knowledge, Beliefs/attitudes	No
Watson, 2000[232,233]	A&E OR hospitalisation	Education	Education	RCT	Admission/readmission, A&E/ED attendance	No
Christiansen, 1997[234]	Ethnic minority, low SES area	Education	Education	CPOS	Admission/re-admission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Severity, Symptoms/asthma control, Self-care behaviour, Knowledge	No
Taggart, 1984[235]	A&E attendance	Education	Education	CPOS	A&E/ED attendance, Scheduled healthcare attendance	No
Bartlett, 2002[236]	Ethnic minority area	Education	Education, use of psycho-educational theories	Before-and-after	Medication use, Self-care behaviour	No

continued

Study	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Bruzzese, 2001[237]	Ethnic minority area	Education	Education	Before-and-after	Health status/QoL, Self-care behaviour, Knowledge, Other	No
Fitzpatrick, 1992[238]	Ethnic minority area	Education	Education, exercise, recreational activities	Before-and-after	Admission/readmission, A&E/ED attendance, Medication use, Absenteeism	No
Lewis, 1996[239]	Ethnic minority, low-income area	Education	Education, other physical and recreational activities	Before-and-after	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance	No
Lurie, 2001[240]	Low-SES area, most ethnic minority	Education	Education, some elements of self-management	Before-and-after	Admission/readmission, A&E/ED attendance, Scheduled healthcare attendance, Symptoms/asthma control, Absenteeism, Health status/QoL, Self-care behaviour	No
Bailey, 2002[241,242]	Ethnic minority, low-SES area	Self-management	Education, self-management	RCT	Absenteeism, Admission/readmission, A&E/ED attendance, Symptoms/asthma control, Health status/QoL, Other	No
Clark, 1986[243–247]	Random sample from area with high ethnic minority population and low SES	Self-management	Education, self-management	RCT	Absenteeism, Psychological morbidity, Other	Yes
Couriel, 2002[248]	A&E attendance	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Respiratory function, Symptoms/asthma control, Health status/QoL	No
Stevens, 2002[249,250]	A&E attendance OR hospitalisation	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Exacerbations, Symptoms/asthma control, Health status/QoL, Self-care behaviour, Knowledge	Yes
Vargas, 2002[251]	Low-income area	Multifaceted	Education, self-management, case management	RCT	Admission/readmission, A&E/ED attendance, Symptoms/asthma control, Absenteeism, Health status/QoL, Self-care behaviour	Yes

Studies with insufficient targeting of difficult asthma in adults

Study	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
de Oliveira, 1999[252–254]	Low SES area	Education	Education, some elements of self-management (e.g. symptom diary, symptom perception)	RCT	Admission/readmission, A&E/ED attendance, Respiratory function, Severity, Symptoms/asthma control, Health status/QoL, Self-care behaviour, Knowledge, Self-efficacy/perceived control	No
Maiman, 1979[255]	A&E attendance for asthma attack	Education	Education, behaviour change strategies, factorial design including various additional components for selected patients	RCT	A&E/ED attendance, Self-care behaviour, Beliefs/attitudes	No
Poon, 2002[256]	Medication use indicative of poor control OR hospitalisation OR A&E attendance OR referral	Education	Education, medical management (by telephone)	Before-and-after	Admission/readmission, A&E/ED attendance	No
Côté, 2001[257,258,458–460]	A&E OR emergency outpatient attendance for acute asthma	Self-management	Education, self-management	RCT	A&E/ED attendance, Other unscheduled healthcare attendance, Respiratory function, Severity, Health status/QoL, Knowledge	No
Cowie, 1997[259]	Emergency treatment in past year	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Exacerbations, Symptoms/asthma control, Self-care behaviour	Yes
Ford, 1996[260]	Ethnic minority (unclear how targeted)	Self-management	Education, self-management	RCT (but no results published)	A&E/ED attendance, Self-care behaviour, Knowledge, Beliefs/attitudes	No
Ghosh, 1998[261]	A&E attendance OR hospitalisation in last year	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Medication use, Respiratory function	Yes
Levy, 2000[262]	A&E attendance for acute asthma	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Medication use, Respiratory function, Severity, Exacerbations, Symptoms/asthma control, Absenteeism, Health status/QoL, Self-care behaviour	No

continued

Study	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Perneger, 2002[263]	Hospitalisation OR A&E attendance for asthma or other reasons	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Symptoms/asthma control, Absenteeism, Health status/QoL, Psychological morbidity, Self-care behaviour, Beliefs/attitudes	No
Steel, 2002[264,265]	A&E attendance	Self-management	Education, self-management	RCT	A&E/ED attendance, Scheduled healthcare attendance	No
D'Souza, 1996[266]	A&E attendance	Self-management	Education, self-management	Before-and-after	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Symptoms/asthma control, Self-care behaviour, Self-efficacy/perceived control, Satisfaction	No
Moudgil, 2000[267]	Ethnic minority subgroup	Multifaceted	Education, self-management, optimisation of medications	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Medication use, Health status/QoL	No
Calder, 2002[268,269]	A&E OR out of hours cooperative service attendance	Multifaceted	Education, self-management, medical review, liaison with GP	RCT	Other unscheduled healthcare attendance, Medication use, Symptoms/asthma control, Health status/QoL	No

Studies with insufficient targeting of difficult asthma in which age group unclear

Study	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Oldam, 1997[270]	Ethnic minority area	Education	Education	CROS	Medication use, Respiratory function, Symptoms/asthma control, Self-care behaviour	No
Gallivan, 1998[271]	Low-SES, ethnic minority area	Education	Education, some elements of self-management, case management, links to other services	Before-and-after	Admission/readmission, A&E/ED attendance, Medication use, Respiratory function, Symptoms/asthma control, Health status/QoL, Knowledge	No
Roque, 1999[272]	Medically underserved area	Multifaceted	Education, self-management, home environmental assessment, support network	Before-and-after	Admission/readmission, A&E/ED attendance, Absenteeism, Health status/QoL	No

Studies with insufficient targeting of difficult asthma including adult and child subgroups

Study	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Jones, 1987[273]	A&E attendance	Education	Education, use of psycho-educational theories, follow-up	RCT	Knowledge, Self-care behaviour	No
Ernst, 1998[274]	A&E attendance	Self-management	Education, self-management	CROS	A&E/ED attendance, Medication use	No

Appendix 12

Before-and-after studies

Ordered by degree of targeting of difficult asthma, type of intervention and then alphabetically by author.

Before-and-after studies in children

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
Richards, 1981[275]	Definite	Poorly controlled asthma PLUS admitted for inpatient treatment PLUS ?poor compliance	Education	Education, self-medication	Admission/readmission, Symptoms/asthma control, Absenteeism, Knowledge, Self efficacy/perceived control, Satisfaction, Other	No
Sheikh, 1997[276]	Definite	Intractable asthma (= severe, uncontrolled) PLUS ?low SES OR ?poor compliance	Education	Education, residential treatment (detail lacking on content)	Admission/readmission, A&E/ED attendance, Medication use	No
Alexander, 1972[277]	Definite	Chronic intractable asthma (moderate to very severe in chronicity)	Psychosocial	Relaxation training	Respiratory function, Psychological morbidity	No
Godding, 1997[278]	Definite	Multiple risk factors (severe, high service use, family history, psychosocial problems, poor compliance) defined as high risk	Psychosocial	Joint medical and psychiatric consultation	Admission/readmission, A&E/ED attendance, Severity, Symptoms/asthma control, Self-care behaviour	Yes
Piazza, 1981[279]	Definite	Intractable asthma PLUS psychosocial problems (most hospitalised, multiple A&E attendances, on oral steroids)	Psychosocial	Psychosomatic therapy	Admission/readmission, A&E/ED attendance, Symptoms/asthma control	No
Bratton, 2001[280]	Definite	Severe refractory asthma PLUS multiple risk factors (complex/high dose medication, side effects, co-morbidity, psychosocial issues)	Multifaceted	Education, self-management, psychotherapy, diet, exercise	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Respiratory function, Exacerbations, Health status/QoL, Psychological morbidity	Yes
Higgins, 1998[281,282]	Probable	Frequent A&E attendance PLUS no primary care provider	Education	Education, allocation to primary care provider	Admission/readmission, A&E/ED attendance, Medication use	Yes

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
O'Neill, 2001[283,284]	Probable	Non-English-speaking background OR family with special needs (low SES, parental physical or psychiatric illness, inadequate social support OR child in care) PLUS 2 or more A&E attendances or acute visits to GP in past year	Education	Education, social support, linking to other services	A&E/ED attendance, Other unscheduled healthcare attendance, Symptoms/asthma control, Absenteeism, Health status/QoL, Knowledge	No
Robinson, 2000[285,286]	Probable	Hospitalisation PLUS low-SES area	Education	Education, reading skills training	Admission/readmission, Other unscheduled healthcare attendance, Knowledge, Self-efficacy/perceived control, Other	No
Weisberg, 1995[287,461]	Probable	Low SES PLUS frequent attenders	Education	Education, camp, exercise	Symptoms/asthma control, Knowledge, Self-efficacy/perceived control, Satisfaction	No
Williams, 1982[288]	Probable	Poorly controlled asthma OR severe PLUS excessive use of health services OR stress in family OR absenteeism	Education	Education, some elements of self-management, medical treatment, exercise, relaxation	A&E/ED attendance, Severity, Absenteeism, Health status/QoL, Self-efficacy/perceived control	No
Baxmann, 1989[289]	Probable	Frequent A&E attendance PLUS poor compliance	Self-management	Education, self-management	Admission/readmission, A&E/ED attendance, Symptoms/asthma control, Self-care behaviour, Knowledge, Self-efficacy/perceived control	No
Fitzpatrick, 1982[290]	Probable	Poor control after medical treatment PLUS adolescent	Psychosocial	Hypnotherapy	A&E/ED attendance	No
Hochstadt, 1980[291,292]	Probable	Overusers of services PLUS ethnic minority, low income	Psychosocial	Behavioural/conditioning techniques	Admission/readmission, A&E/ED attendance, Self-care behaviour	No
Onnis, 1993[293]	Probable	Uncontrolled asthma PLUS more than 5 crises (defined as untreatable)	Psychosocial	Psychotherapy, medical treatment	Admission/readmission, A&E/ED attendance, Respiratory function, Severity, exacerbations, Symptoms/asthma control, Psychological morbidity	No
Zeltzer, 1980[294,295]	Probable	Adolescent PLUS poor control (frequent attacks, frequent A&E attendance, poor pulmonary functioning AND poor compliance)	Psychosocial	Self-hypnosis	A&E/ED attendance, Medication use, Respiratory function, Severity, exacerbations, Psychological morbidity, Other	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
Marosi, 2001[296]	Probable	Uncontrolled asthma (including due to poor compliance)	Multifaceted	Education, self-management, electronic monitoring, assessment, medical treatment	Medication use, Respiratory function, Severity, Symptoms/asthma control, Self-care behaviour, Knowledge	No
Sherman, 2001[297]	Probable	Poor compliance PLUS subgroup poor control OR high health service utilisation OR identified as at risk	Multifaceted	Education, self-management, home visits, medical neglect referral as necessary	Admission/readmission, A&E/ED attendance, Self-efficacy/perceived control	No
Stout, 1998[298]	Probable	Hospitalisation OR 3 or more A&E attendances PLUS low SES	Multifaceted	Education, self-management, liaison, social support	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Social support	No
Agarwal, 1999[299]	Possible	Hospitalisation PLUS ?mostly deprived	Education	Education, drop-in clinic	Admission/readmission, A&E/ED attendance, Other	No
Guadano, 1995[300]	Possible	Severe OR poor control OR long duration of asthma OR poorly compliant OR over-protected OR poor attitude OR would benefit	Education	Education, exercise, camp, outdoor activities	Self-care behaviour, Knowledge, Beliefs/attitudes, Self-efficacy/perceived control	No
Kelly, 1998[301]	Possible	Moderate–severe asthma PLUS low income AND ?high users	Education	Education, social activities, exercise	Admission/readmission, A&E/ED attendance, Absenteeism, Self-care behaviour, Self-efficacy/perceived control	Yes
Malik, 2002[302]	Possible	Hospitalisation	Education	Education, 'educational counselling', some elements of self-management	Admission/readmission, A&E/ED attendance	Yes
Reid, 2000[303]	Possible	One or more hospitalisations OR one or more A&E attendance PLUS inner city, low income, most ethnic minority	Education	Education, psychosocial assessment	Admission/readmission, A&E/ED attendance, Medication use, Symptoms/asthma control, Absenteeism, Health status/QoL, Psychological morbidity, Self-care behaviour, Knowledge, Self-efficacy/perceived control, Satisfaction	No
Robinson, 1985[304,305]	Possible	Moderate–severe asthma PLUS at least one hospitalisation	Education	Education	A&E/ED attendance, Medication use, Knowledge, Beliefs/attitudes, Self-efficacy/perceived control	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
Taggart, 1991[306]	Possible	Hospitalisation	Self-management	Education, self-management	A&E/ED attendance, Knowledge	No
Volsko, 1998[307]	Possible	At risk of A&E attendance because no medical treatment plan documented	Self-management	Education, self-management	Admission/readmission, A&E/ED attendance, Other	Yes
Alexander, 1979[308]	Possible	Severe asthma	Psychosocial	Relaxation training	Respiratory function, Symptoms/asthma control	No
Feldman, 1976[309]	Possible	Severe asthma	Psychosocial	Biofeedback	Respiratory function	No
Park, 1996[310]	Possible	Somatisers OR over-perceivers OR anxious	Psychosocial	Cognitive–behavioural techniques	Admission/readmission, A&E/ED attendance, Medication use, Absenteeism, Self-care behaviour	No
Spaulding, 2001[311]	Possible	On inhaled steroids PLUS non-compliant	Psychosocial	Behavioural techniques	Respiratory function, Severity, Self-care behaviour, Satisfaction	No
Martinez-Donate, 2002[312,313,462]	Possible	Ethnic minority, low SES	Multifaceted	Education, self-management, environmental control measures	Self-care behaviour, Knowledge	No

Before-and-after studies in adults

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
Doan, 1996[314,315]	Definite	ICU admission (and poor compliance in associated Detjen case study paper)	Education	Education, medical treatment, emergency call service, follow-up, some elements of self-management	Admission/readmission, A&E/ED attendance, Scheduled healthcare attendance, Medication use, Self-care behaviour, Other	Yes
Forshee, 1998[316]	Definite	High risk as identified via patterns of service use, medication use or severity	Education	Education	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Medication use, Severity, Symptoms/asthma control, Absenteeism, Health status/QoL, Knowledge, Satisfaction	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
Levenson, 1997[317]	Definite	NFA PLUS poor compliance	Education	Education, medical treatment, psychiatric care as necessary	Admission/readmission, A&E/ED attendance	Yes
Murphy, 1995[318]	Definite	High risk (hospitalisation PLUS ethnic minority, low-SES area AND suspected poor compliance)	Multifaceted	Education, self-management, breath control/relaxation techniques, exercise	Medication use, Self-care behaviour, Knowledge, Other	No
Trautner, 1993[319–322]	Definite	Moderate to severe asthma PLUS hospitalisation due to asthma being refractory to outpatient treatment	Multifaceted	Education, self-management, medical treatment	Admission/readmission, A&E/ED attendance, Scheduled healthcare attendance, Medication use, Respiratory function, Exacerbations, Absenteeism, Self-care behaviour, Knowledge, Self-efficacy/perceived control	Yes
Villenueva, 2000[323,324]	Probable	Difficult to control asthma (hospitalisations OR 2 or more A&E attendances in 6 months)	Education	Education, medical assessment	Admission/readmission, A&E/ED attendance, Medication use, Respiratory function, Health status/QoL, Satisfaction	Yes
Choy, 1999[325]	Probable	Ethnic, low SES PLUS >moderate asthma subgroup	Self-management	Education, Self-management	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Medication use, Respiratory function, Symptoms/asthma control, Absenteeism, Self-care behaviour, Knowledge	No
Franceschi Dusi, 1985[326]	Probable	Severe asthma PLUS frequent hospitalisations	Psychosocial	Group psychotherapy	Admission/readmission, Medication use, Symptoms/asthma control, Psychological morbidity	No
Morrison, 1988[327]	Probable	Not responding to treatment OR poor control	Psychosocial	Hypnotherapy	Admission/readmission, A&E/ED attendance, Medication use, Respiratory function	No
Nagata, 1995[328]	Probable	Intractable subgroup (moderate–severe asthma PLUS psychosocial OR daily living problems)	Psychosocial	Stepwise psychosomatic treatment (psychological and medical treatment)	Severity, Other	No
Teshima, 1991[329]	Probable	Intractable (= steroid dependent), severe subgroup	Psychosocial	Biopsychosocial approach – medical treatment and psychological therapies	Medication use, Respiratory function, Psychological morbidity, Other	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
White, 1961[330]	Probable	Subgroup with severe asthma and repeated hospitalisations, most psychological morbidity	Psychosocial	Hypnosis	Respiratory function, Health status/QoL	No
Brown, 1997[331]	Probable	High risk (no details given)	Multifaceted	Education, self-management, medical treatment	Admission/readmission, A&E/ED attendance	Yes
Jowers, 2000[332–335,463]	Probable	Severe (as per guidelines or excessive health service use) PLUS unstable/difficult to manage	Multifaceted	Education, self-management, case management, medical assessment, medical treatment	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Absenteeism, Health status/QoL, Other	Yes
Kennerly, 1997[336]	Probable	2 or more A&E attendances OR one or more hospitalisation in past year PLUS low-SES, ethnic minority area	Multifaceted	Education, self-management, case management, medical evaluation and treatment, liaison, improved access, multidisciplinary clinic	A&E/ED attendance	Yes
McDonald, 2002[337]	Probable	Severe PLUS hospitalisation OR A&E attendance OR frequent outpatient attendance	Multifaceted	Education, self-management, medical treatment	Admission/readmission, A&E/ED attendance, Symptoms/asthma control, Self-care behaviour, Knowledge	No
Self, 1994[338]	Probable	>5 A&E attendances or 2 hospitalisations in 2 years OR >3 A&E attendances or 1 hospitalisation in 1 year PLUS ethnic minority	Multifaceted	Education, self-management, optimisation of medications, environmental control measures, easy telephone access	Admission/readmission, A&E/ED attendance	No
Didier, 1999[339]	Possible	Majority hospitalised (75%), severe	Education	Education, rehabilitation programme	A&E/ED attendance, Self-care behaviour, Knowledge	No
DiMango, 2002[340]	Possible	A&E attendance PLUS low income	Education	Education, screening for psychosocial issues, home visits	Admission/readmission, A&E/ED attendance, Health status/QoL	No
Leshchenko, 1999[341]	Possible	Severe subgroup	Education	Education	Respiratory function, Exacerbations, Psychological morbidity	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
Pauley, 1995[342]	Possible	3 or more A&E attendances in last year for acute asthma	Education	Education, medical treatment, open-door policy, some elements of self-management	A&E/ED attendance, Scheduled healthcare attendance, Medication use, Exacerbations, Self-care behaviour, Self-efficacy/perceived control, Other	Yes
D'Souza, 2000[343–349]	Possible	Ethnic minority (Maori)	Self-management	Education, self-management	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Exacerbations, Symptoms/asthma control, Self-care behaviour, Satisfaction	No
Nahri, 2002[350–352]	Possible	Perceived problems with management OR poor compliance	Self-management	Education, self-management	Knowledge, Beliefs/attitudes	No
Zimmer, 2000[353]	Possible	Hospitalisation OR 2 or more A&E attendances (defined as moderate–severe/uncontrolled asthma)	Self-management	Education, self-management	Admission/readmission, A&E/ED attendance, Absenteeism, Health status/QoL, Satisfaction	No
Ebana, 1994[354]	Possible	Most moderate–severe asthma PLUS high helplessness subgroup	Psychosocial	Psychosomatic treatment (medical treatment plus psychological issues addressed)	Respiratory function, Severity, Symptoms/asthma control, Psychological morbidity	No
Kihara, 1992[355]	Possible	Severe asthma	Psychosocial	Psychosomatic treatment	Symptoms/asthma control	No
Yamanaka, 1980[356]	Possible	Severe asthma subgroup PLUS ?anxiety	Psychosocial	Behaviour therapy	Severity, Other	No
Hashizume, 1996[357]	Possible	Severe asthma subgroup	Multifaceted	Education, self-management, psychotherapy	Respiratory function, Severity, Symptoms/asthma control	No
Maljanian, 1999[358–361]	Possible	Hospitalisation OR A&E attendance OR GP referral PLUS low-SES, mostly ethnic minority area	Multifaceted	Multifaceted self-management, home assessments, professional education	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Severity, Symptoms/asthma control, Health status/QoL, Psychological morbidity, Self-care behaviour	No

Before-and-after studies in which age group unclear

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Types of outcomes assessed	Including costs?
Garvey, 2002[362]	Possible	Moderate–severe asthma PLUS A&E attendance	Self-management	Education, self-management	Admission/readmission, A&E/ED attendance, Medication use	No

Appendix 13

Summary characteristics of controlled studies in children reviewed in depth

Studies ordered by degree to which they targeted difficult asthma, type of intervention, study design and then alphabetically by author.

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Alexander, 1972[363]	Definite	Intractable, hospitalised	Psychosocial	Relaxation	CCT	Respiratory function, Severity, A&E/ED attendance, Other	No
Weinstein, 1998[364–373]	Definite	Multiple risk factors (3+ hospitalisations OR respiratory arrest OR 4 or more A&E attendances OR 4 or more oral steroid bursts OR dependence on steroids OR complicating psychosocial factors OR significant school absence) over last year	Multifaceted	Education, self-management, medical treatment, psychiatric assessment, environmental assessment, exercise	CROS	Admission/readmission, A&E/ED attendance, Medication use	Yes
Cowie, 2002[374]	Probable	Multiple A&E attendances PLUS adolescent	Education	Education, some elements of self-management	RCT	Admission/readmission, A&E/ED attendance, Medication use, Asymptoms/asthma control, Health status/QoL, Self-care behaviour, Medication use, Absenteeism	No
Madge, 2002[375]	Probable	Teenagers AND hospitalisation in past year (= severe asthma)	Education	Education, some elements of self-management	RCT	Admission/readmission, A&E/ED attendance	No
Mitchell, 1986[376]	Probable	Hospitalisation (NOT NFA) PLUS ethnic minority subgroup	Education	Education	RCT	Admission/readmission, A&E/ED attendance, Exacerbations, Medication use, Symptoms/asthma control, Absenteeism, Beliefs/attitudes, Knowledge, Other	No
Shields, 1990[377,464–467]	Probable	1 or more A&E attendance OR hospitalisation in past 4 years PLUS low income, ethnic minority	Education	Education	RCT	Admission/readmission, A&E/ED attendance, Scheduled healthcare attendance	Yes
Colland, 1993[378]	Probable	Absenteeism PLUS inadequate self-management	Self-management	Education, self-management, use of cognitive behavioural therapy techniques	RCT	Admission/readmission, Other unscheduled healthcare attendance, Symptoms/asthma control, Severity, Health status/QoL, Self-care behaviour, Absenteeism, Psychological morbidity, Self-efficacy/perceived control, Beliefs/attitudes, Knowledge	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Kelly, 2000[379,380]	Probable	Hospitalisation OR 2 or more A&E attendances in last year PLUS low SES	Self-management	Education, self-management	CCT	Admission/readmission, A&E/ED attendance, Medication use, Health status/QoL, Scheduled healthcare attendance, Other	Yes
Dahl, 1990[381]	Probable	Severe PLUS over-using beta-agonists	Psychosocial	Behavioural therapy	RCT	Medication use, Respiratory function, Absenteeism, Health status/QoL, Symptoms/asthma control	No
Davis, 1973[382,383]	Probable	At treatment centre for intractable asthma PLUS severe subgroup	Psychosocial	Relaxation with biofeedback	CCT	Respiratory function, Psychological morbidity, Other	No
Weder, 1994[384]	Probable	Poorly controlled asthma PLUS psychological morbidity	Psychosocial	Psychotherapy	CPOS	Respiratory function	No
Backman, 1981[385]	Probable	Severe asthma PLUS psychosocial complications	Psychosocial	Psychotherapy, family therapy	CROS	Severity, Exacerbations, Psychological morbidity	No
Catrambone, 2000[386]	Probable	3 or more A&E attendances OR 2 or more hospitalisations in 2 years OR 1 or more hospitalisations for >4 days PLUS most ethnic minority (defined as high-risk group)	Multifaceted	Education, self-management, assessment, primary care liaison	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Symptoms/asthma control, Absenteeism	No
Greineder, 1999[387–389]	Probable	Hospitalisation for acute asthma OR GP identified at risk of exacerbation PLUS most ethnic minority	Multifaceted	Education, self-management, allergy treatment, case management	RCT	Admission/readmission, A&E/ED attendance	Yes
Griffiths, 2002[390–393]	Probable	Hospitalisation OR emergency attendance AND low SES area PLUS ethnic-minority subgroup	Multifaceted	Education, self-management, professional education	RCT	Admission/readmission, A&E/ED attendance, Health status/QoL, medication use, Self-care behaviour, Scheduled healthcare attendance, Other unscheduled healthcare attendance	Yes
Hanson, 1998[394–396]	Probable	Moderate–severe asthma PLUS low SES AND ethnic minority	Multifaceted	Education, self-management, social support	RCT	Self-care behaviour, Self-efficacy/perceived control, Social support	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Sullivan, 2002[397–401,468–470]	Probable	Hospitalisation in past 6 months OR use of 2+ medications OR unscheduled attendance OR 2 days or nights of symptoms in past 2 weeks AND inner city low-SES area PLUS most severe subgroup analysis	Multifaceted	Education, self-management, referral to other services, environmental control measures, linking to family physician	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Symptoms/asthma control, Medication use, Psychological morbidity	Yes
Alexander, 1988[402]	Possible	A&E attendance PLUS low income OR no other source of care	Education	Education	RCT	Admission/readmission, A&E/ED attendance, Scheduled healthcare attendance	Yes
Evans, 1987[403]	Possible	3+ episodes of symptoms in past year PLUS ethnic minority, low income	Education	Education, some elements of self-management	RCT	Other unscheduled healthcare attendance, Symptoms/asthma control, exacerbations, Absenteeism, Self-care behaviour, Self-efficacy/perceived control, Other	No
Garrett, 1994[404]	Possible	Area of low SES PLUS A&E attendance OR hospitalisation OR severe	Education	Education, link to GP/referral	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Severity, Symptoms/asthma control, Medication use, Health status/QoL, Respiratory function, Absenteeism, Psychological morbidity, Self-care behaviour, Social support, Other	No
Krieger, 2002[405,471]	Possible	Low income, mostly ethnic minority	Education	Education, environmental control measures	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Symptoms/asthma control, Medication use, Health status/QoL, Respiratory function, Self-care behaviour, Absenteeism, Knowledge, Satisfaction, Other	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Vazquez, 1993[406]	Possible	Low self-care subgroup (NOT severe)	Education	Education, some elements of self-management, relaxation training	CCT	Other unscheduled healthcare attendance, Symptoms/asthma control, Exacerbations, Medication use, Health status/QoL, Respiratory function, Absenteeism, Self-care behaviour, Self-efficacy/perceived control	No
Collins, 1994[407]	Possible	Hospitalisation	Education	Education, some elements of self-management	CPOS	Knowledge, other	No
Fisher, 1996[408,409]	Possible	A&E attendance OR hospitalisation in past year PLUS ethnic minority, low-income area	Education	Education, social support, community involvement	CPOS	Admission/readmission, A&E/ED attendance, Self-care behaviour, Beliefs/attitudes	No
Westphal, 1984[410]	Possible	Predominantly severe asthma	Education	Education, medical treatment	CPOS	Severity, Self-care behaviour, Beliefs/attitudes, Knowledge	No
Madge, 1997[411]	Possible	Hospitalisation	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Symptoms/asthma control	No
McNabb, 1985[412–415]	Possible	A&E attendance PLUS poorly compliant? (= difficult to manage asthma in Bagshaw paper)	Self-management	Education, self-management, behavioural goal setting	RCT	Admission/readmission, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Medication use, Self-care behaviour, Knowledge	Yes
Ronchetti, 1997[416]	Possible	Severe subgroup	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Exacerbations, Severity, Medication use, Respiratory function	No
Wesseldine, 1999[417]	Possible	Hospitalisation	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Symptoms/asthma control, Health status/QoL, Absenteeism, Other	No
Gold, 1986[418]	Possible	Relatively severe PLUS ethnic minority, low income area	Psychosocial	Conflict management, problem solving	RCT	Symptoms/asthma control, Self-care behaviour, Beliefs/attitudes, Other	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Gustafsson, 1988[419,420]	Possible	Severe asthma	Psychosocial	Family therapy	RCT	Admission/readmission, A&E/ED attendance, Symptoms/asthma control, Medication use, Severity, Health status/QoL, Respiratory function, Self-care behaviour	No
Wilkening, 1999[421]	Possible	Asthma patients in need of psychological treatment	Psychosocial	Behaviour therapy	RCT	Health status/QoL, Respiratory function, Psychological morbidity, Self-care behaviour	No
Bonner, 2002[422]	Possible	Low SES plus majority poorly compliant	Multifaceted	Education, self-management, medical treatment, social support, family coordinator	RCT	Symptoms/asthma control, Medication use, Health status/QoL, Respiratory function, Self-care behaviour, Beliefs/attitudes, Self-efficacy/perceived control, Knowledge, Social support	No
Harish, 2001[423]	Possible	A&E attendance PLUS low-SES, ethnic minority area	Multifaceted	Education, self-management, medical treatment, environmental control	RCT	Admission/readmission, A&E/ED attendance, Severity	Yes
Lewis, 1994[424,425,472,473]	Possible	Ethnic minority, low SES PLUS high use of emergency services	Multifaceted	Education, self-management, medical treatment	RCT	Admission/readmission, A&E/ED attendance, scheduled healthcare attendance, severity, knowledge	Yes
Kirk, 2001[426–428]	Possible	Low-income area PLUS at least 1 A&E attendance or hospitalisation in 3-year period	Multifaceted	Education, self-management, case management, professional education	CROS	Admission/readmission, A&E/ED attendance, Medication use, Self-care behaviour, Absenteeism	Yes

Appendix 14

Details of patients in studies of children

Details of patients in studies of children with definite targeting of difficult asthma

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Alexander, 1972	Hospitalised children with chronic intractable asthma targeted but no specific discussion of at-risk status	10–15 years	Residents of residential treatment home for children with intractable chronic asthma; moderate to very severe asthma	None	Suspected mental retardation; organic brain pathology; serious psychopathology (e.g. psychosis)
Weinstein, 1998	Targeted children with very severe asthma who had failed outpatient treatment and in which psychosocial factors were important. This subset of patients have persistent symptoms requiring frequent emergency care, hospitalisations and oral steroid use with adverse side-effects and are at increased risk of death	6 months–17 years	During last year: 3+ hospitalisations, 4+ emergency visits, 4+ oral steroid bursts, oral steroid dependence daily/every other day, hypoxic seizures with status asthmaticus, respiratory failure, psychosocial factors or poor compliance leading to acute symptoms, >30 days off school OR failure to advance to next grade (most multiple factors, all refractory to outpatient treatment)	Family agree to attend sessions	None

Details of patients in studies of children with probable targeting of difficult asthma

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Backman, 1981	Targeted children with chronic asthma treated at hospital in whom psychosocial factors had complicated the course of asthma	Not stated (mean at follow-up: 13 years 9 months)	Patients with chronic asthma treated at children's hospital between 1966 and 1971	Asthma complicated by psychiatric, psychological and social factors	None
Catrambone, 2000	Asthma and associated mortality a particular concern amongst the young; costs associated with health utilisation are substantial with hospitalisation rates increasing dramatically in children	1–15 years	High risk: 2 or more hospitalisations for asthma in past 2 years and/or 3 or more emergency room visits for asthma in past 2 years and/or single hospitalisation for asthma with stay longer than 4 days	Remained members of Health Maintenance Organisation and completed 1 year of care	None

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Colland, 1993	Targeted children with inadequate self-management abilities which imply inadequate coping with asthma in daily situations or can result from denial/anxiety and is associated with increased risk of hospitalisation and unnecessary use of medical services	8–13 years	Treated by paediatrician for more than 1 year; diagnosis of asthma; had been absent from school because of asthma more than once in last year	Fluent Dutch; selection of patients with insufficient self-management abilities was undertaken according to their scores on an asthma coping test	None
Cowie, 2002	Adolescents and young adults with chronic disease considered difficult to treat because they deny symptoms, are poorly adherent to therapy and fail to make the transition from paediatric to adult medical care; age group identified as at high risk of death from asthma and susceptible to risk behaviours which set unfavourable disease course; patients with additional risk factors of repeated visits to ED signal a pattern of severe disease and crisis management	15–20 years	Received ED treatment for asthma	None	None
Dahl, 1990	In over-users of services and those with compliance problems, asthma is often complicated by behavioural and other psychological factors	Children	Severe asthma and using continual beta-agonist therapy	None	None
Davis, 1973	Targeted subgroup of severe asthmatics on oral steroids	6–15 years	Inpatients at a residential treatment centre for children with intractable asthma; severe subgroup identified on basis of being on maintenance doses of oral steroids	None	None
Greineder, 1999	Identified as high-risk group; most lower socio-economic status and sample showed increased representation of ethnic minority compared to area as a whole; represented most severely affected and high users of emergency and hospital services. Asthma morbidity, admissions and costs disproportionally high and poor attendance a problem among such patients	1–15 years	Hospitalised with acute asthma OR referred by primary care paediatricians on basis of subjective impression that patients at risk for asthma exacerbations	Urban health centres of Health Centers Division of Harvard Pilgrim Health Care HMO	<12 months old; wheezing for the first time; eventual diagnosis of broncho-pulmonary dysplasia

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Griffiths, 2002	Patients hospitalised or attending A&E for asthma in a deprived, multi-ethnic area, referred to as a high-risk group. Mortality and morbidity higher for ethnic minorities wherever studied	4–60 years (majority children)	Doctor diagnosis; admission, A&E or GP out of hours attendance in previous 2 years	Registered with GP in Tower Hamlets/Newham	None
Hanson, 1998	Certain groups of children are at greater risk for asthma-related problems because of barriers of poverty, language, lack of access to medical care and culturally based beliefs about health and illness. There are adverse consequences of chronic illness in rural families	6 months–12 years	Moderately severe to severe asthma as determined by pulmonologists using NAEPP guidelines	Low income (no details)	Other serious underlying medical conditions
Kelly, 2000	Low-income, minority children have higher prevalence, ED use, hospitalisation and death rates and tend to rely on acute episodic care rather than routine preventive care. Particularly important to focus on those with highest morbidity in which access to medical care and psychosocial factors play a major role in management – those selected for study had more than two ED visits or were hospitalised at least once in previous year	2–16 years	Seen in ED 2 or more times or hospitalised for asthma at least once in the previous year (criteria for hospitalisation for status asthmaticus based on hypoxia, failed response to medication given)	Insurance covered through Medicaid; primary care received through Children's Hospital Allergy Clinic; not evaluated by an asthma specialist in the preceding 2 years	None
Madge, 2002	Teenagers with severe asthma (defined via hospitalisation in last year), who often have psychological risk factors which results in high healthcare use and particularly, frequent hospital admissions. Vulnerable period for psychosocial difficulties makes them a high risk group	Teenagers	Admission for acute asthma in last year (= severe)	None	None
Mitchell, 1986	Rates of admission increasing, partly owing to increased readmission rate; Polynesians over-represented in admission statistics and have poorer self-management	Children aged 2+ years	Patients discharged from Auckland hospital with asthma	Europeans and Polynesian ethnic groups only	<2 years old; previous history of life-threatening attacks; home outside hospital catchment area

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Shields, 1990	Asthma mortality higher in ethnic minority groups and increasing in frequency; population targeted low income, 80% black, and had one A&E or hospitalisation for asthma in the last 4 years	<18 years	At least 1 ED visit or hospitalisation for asthma in the last 4 years	None	None
Sullivan, 2002	Children in US impoverished inner cities disproportionately at risk for avoidable mortality and morbidity	5–11 years	Physician diagnosis of asthma; use of 2+ asthma medications, 1+ asthma hospitalisation, 1+ unscheduled visit for asthma in prior 6 months OR symptoms or sleep disruption for >2 days/nights in prior 2 weeks	Inner city areas where >20% below federal poverty guidelines	None
Weder, 1994	Perception of symptoms and exacerbation into attacks is related to psychosocial conditions – symptoms especially maintained in children with emotional disorders	Children	Insufficiently controlled asthma	Diagnosis of emotional disturbance according to Diagnostic and Statistical Manual of Mental Disorders IIIR	None

Details of patients in studies of children with possible targeting of difficult asthma

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Alexander, 1988	Targeted poorly controlled, poorly compliant asthmatic children who historically used ED as primary source of asthma care. Poor compliance and poor knowledge contribute to morbidity and are particularly prevalent in patients from low-income families	<14 years	1 or more emergency unit visits in prior 12 months for acute asthma; no consistent source of care for asthma management other than ED during prior 12 months (implying low income)	None	None
Bonner, 2002	Asthma morbidity and mortality rates have steadily increased particularly among urban populations; in previous study 83% urban Latino and African-Americans classified as precompliant in terms of their readiness to manage asthma	Children	Treated for asthma in either the general pediatric practice or the pulmonary clinic or university hospital during previous 12 months	?Latino or African-American	None

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Collins, 1994	Children admitted to hospital with asthma often not reached by traditional education programmes. No specific discussion of at-risk status	Children	Admitted with asthma	None	None
Evans, 1987	Low-income patients, predominantly of Hispanic and black ethnic origin; selected on basis of having 3+ asthma episodes in past year. No clear discussion of at-risk status	3rd-, 4th- or 5th-grade (8–11 years)	Parental report of 3+ asthma episodes in last year; 93% asthma diagnosed by physician	Attending school in 2 New York community school districts; some degree of literacy assumed as written invitation sent	None
Fisher, 1996	African-Americans have disproportionate asthma prevalence (20% higher), morbidity and mortality (5–7 times more likely to die), plus under-utilisation of medical care, poor day-to-day management of asthma, acceptance of inadequate care and poor attitudes. Low-income neighbourhoods, such as the predominantly low-income African-American neighbourhoods targeted, also have higher exposure to environmental triggers	5–14 years	Seen in ED for asthma	For intervention, within 4 zip code boundary of Grace Hill service area. For control, within 4 zip code boundary of St Louis City but outside Grace Hill service area	None
Garrett, 1994	Targeted patients attending A&E with acute asthma and living within a defined geographic area of high emergency room users. In this area of high social and medical needs with a large immigrant population, mortality and admissions rates for asthma highest in Auckland, rates four times higher in Pacific Islander ethnic minority groups, also higher in Maoris mainly owing to lack of self-management skills, social factors and non-attendance	2–55 years (child and adult subgroup analyses)	Acute asthma diagnosed by doctor whilst attending ED	Lived within a defined geographic area with high A&E use and intended to reside locally for next 9 months; understood English sufficiently; could be contacted within 5 days of attending	None

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Gold, 1986	Low income, urban clinic families are at greater risk for disruptive consequences of asthma	6–12 years	Confirmed diagnosis of asthma; treated in inner-city clinic (serving low-income, ethnic area and patients who have asthma of sufficient severity such that they cannot be managed via other services) for at least 3 months	English-speaking caretaker	Mental retardation, psychosis or severe emotional disorder in child or adult
Gustafsson, 1988	Severe childhood asthma targeted; disease can affect whole family; psychosocial factors, including problems with family relations are often present	6–15 years	20 most severe chronic cases (based on functional impact of disease) from 600 outpatients; asthma 'grade D'	None	Other severe illness
Harish, 2001	Inner-city, predominantly ethnic minority and low-income population with other socio-economic risk factors; increasing rates of ED attendance and admissions in area; risk factors for higher rate of asthma in inner city include poverty, overcrowding, indoor allergies, smoking, poor compliance and other psychosocial issues	2–17 years	Treated in paediatric ED for asthma	None	None
Kirk, 2001	Low-income children with moderate–severe asthma all of whom had at least one A&E visit or hospitalisation during prior 3 years. Referred to as 'at risk'	5–19 years	Moderate–severe asthma, at least 1 A&E visit or hospitalisation during previous 3 years	Low-income status (determined by zip code)	None
Krieger, 2002	Low-income and ethnic minority populations disproportionately affected by asthma; in local area children living in high poverty three times higher hospitalisation rate; both partially resulting from disproportionate exposure to poor living conditions and increased sensitisation to allergens	4–12 years	Diagnosis of at least mild persistent asthma	Caretaker speaking English, Spanish or Vietnamese; household income less than 200% of poverty or Medicaid enrolment	Other cardiopulmonary disease; participation in other asthma interventions in past 2 years
Lewis, 1994	Latino children more likely from families below poverty level (more than double that of non-Latinos = 25%); growing prevalence of asthma in this group; potential language and cultural barriers to education	7–12 years	Confirmed diagnosis of asthma	Hispanic, from disadvantaged family	None

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age	Asthma	Other	
Madge, 1997	Readmissions to hospital in childhood asthma are common; 20–30% of children admitted are readmitted within 1 year	>2 years	Admitted with acute asthma	None	<2 years
McNabb, 1985	Targeted children who had not been compliant with the standard medical management and had at least one emergency treatment for asthma in the previous year. Referred to as high utilisers of emergency care facilities (McNabb, 1984) and having 'difficult to manage' asthma (Bagshaw, 1982)	9–13 years	On regimen of bronchodilators; at least one emergency treatment for asthma in previous year	Other papers refer to difficult to manage asthma and children being high utilisers but no further details of criteria given	Known developmental or behavioural problems
Ronchetti, 1997	Severe asthmatic subgroup identified via composite severity score based on: % predicted FEV_1; number and amount of medications used during baseline period and number of attacks, hospitalisations and emergency treatments in prior 12 months	Children	Outpatients seen for the first time in an asthma clinic who received a diagnosis of asthma	None	None
Vazquez, 1993	Subgroup identified with poor baseline self-management practices	8-13 years	Diagnosis by specialist; positive results in one or more of the recognised tests of degree and severity of allergic responses; stable therapeutic regimen over last 6 months; asthma attack frequency of at least [one?] a month throughout entire year. All subjects had mild to moderate intensity asthma	Residence within 30 km of the hospital	Nonatopic disease and/or psychological disorders
Wesseldine, 1999	Of admissions for acute asthma in Leicester, 24% readmitted within 1 year, up to 45% elsewhere	2–16 years	Hospital admission with diagnosis of acute asthma	None	None
Westphal, 1984	Predominantly severe	Children	No details given in abstract obtained	None	None
Wilkening, 1999	Asthma patients in need of psychological treatment	Not stated (but undertaken at children's treatment centre)	Asthma patients in need of psychological treatment	None	None

Appendix 15

Control groups for studies in children

Details of control groups in studies of primarily educational interventions for children

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Alexander, 1988	Nurse-managed programme	Control group	No	Initial evaluation and treatment conference where principles of avoidance and environmental control reviewed, asthma pathophysiology discussed, instruction provided in signs and symptoms and use of medication. Patients instructed to receive primary ongoing care through the general paediatric clinic and schedule return appointment to allergy clinic every 4 months (reminder sent 2 weeks before)
Collins, 1994	Inpatient education programme	Education by traditional methods	Yes	Convenience sample advised to attend GP/asthma clinic for care and information
Cowie, 2002	Young adult asthma programme	Control group	Yes	Assessment and instruction in inhaler technique, advised to visit their regular physician
Evans, 1987	Self-management programme (Open Airways)	Control group	Yes	None given
Fisher, 1996	Neighbourhood asthma coalition	Control neighbourhoods	Yes	None given
Garrett, 1994	Community healthcare intervention	Usual care	Yes	Usual management by physicians with referral to hospital asthma clinic for some patients
Madge, 2002	Group educational intervention	Control group	Yes	None given
Mitchell, 1986	Asthma education by community child health nurses	Control group	Yes	None given
Shields, 1990	Educational programme	Control group	Yes	None given
Vazquez, 1993	Self-management education plus progressive relaxation training	Waiting list control	Yes	Received pharmacological treatment and asked to attend evaluation sessions
	Self-management education			
Westphal, 1984	Intercritical treatment and education	Ambulatory treatment only	No	Outpatient medical treatment only
		Control group	Yes	Medical attention in emergency services when patients had an asthma crisis

Details of control groups in studies of self-management interventions for children

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Colland, 1993	Behavioural self-management programme	Placebo control	No	Children and parents attended an information session using similar materials with children to those used in the experimental group but with less specific information about asthma whilst parents watched a film about a child with asthma
		Usual care control	Yes	None given
Kelly, 2000	Comprehensive intervention programme	Control group	Yes	Care from the primary care providers in the outpatient clinic which could include referral to the allergy clinic or other educational intervention and involved routine communication via letter
Madge, 1997	Structured asthma education and home management training programme	Usual care	Yes	Usual clinical care with decisions about drug management and medical follow-up determined by attending paediatrician following standard practice
McNabb, 1985	Asthma self-management programme (AIR WISE)	Usual care	Yes	Usual medical treatment via outpatient allergy clinics which included diagnostic assessment, medical therapy and recommendations for avoidance of triggers
Ronchetti, 1997	Open Airways standard 8-week programme Open Airways shortened 4-week programme Living with Asthma standard 8-week programme Living with Asthma shortened 4-week programme	Usual care	Yes	Standard asthma care without an education programme
Wesseldine, 1999	Structured discharge package	Usual care	Yes	Standard care/discharge plan which was variable and dependent on availability of parents, enthusiasm, experience of staff present and time constraints. Some received written information, some verbal, some inhaler demonstration, few received written home management plan

Details of control groups in studies of psychosocial interventions for children

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Alexander, 1972	Systematic relaxation training	Control group	No	Up to 6 20-minute sessions (mean 4.7 sessions) in which patients instructed to sit quietly for 15 minutes. Quiet talking, reading and sewing allowed
Backman, 1981	Psychotherapy and family therapy	Psychosocial investigation only	Yes	Psychological investigation and mapping of social situation with paediatric allergologic therapy
Dahl, 1990	Behaviour therapy	Control group	Yes	Usual care at a paediatrics unit
Davis, 1973	Jacobsonian relaxation training assisted by biofeedback Jacobsonian relaxation training alone	Control group	No	Provided with assorted reading material and told to relax, same duration and number of sessions as intervention groups
Gold, 1986	Problem-solving conflict management	Information–discussion (attention–control) group	No	Same format and content as intervention but no training in problem-solving skills, information on topics only
		Waiting-list control	Yes	Intervention treatment offered after end of study
Gustafsson, 1988	Family therapy	Control group (conventional therapy)	Yes	Served as waiting list control with family therapy given later
Weder, 1994	Individual psychotherapy	Control group	Unclear	Patients from a previous study
Wilkening, 1999	Standardised behavioural therapeutic group programme	Usual medical care	Yes	General medical therapy

Details of control groups for studies of multifaceted interventions for children

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Bonner, 2002	Individualised asthma education intervention	Usual medical care	Yes	None given
Catrambone, 2000	Asthma case management	Usual care	Yes	Routine outpatient care provided by HMO physicians plus one-off education class
Greineder, 1999	Asthma outreach programme (education plus follow-up)	Education only	No	As for intervention group but with referral back to paediatrician after single education session rather than nurse follow-up
Griffiths, 2002	Liaison nurse intervention	Control	No	Liaison nurses provided inhaler check and written information to control patients and single visit to practice to discuss general asthma management guidelines
Hanson, 1998	Comprehensive medical care plus education intervention (Open Airways programme)	Control group – comprehensive medical care	No	2-year intervention involving free comprehensive medical treatment and standard individual education from a trained nurse educator during clinic visits at tertiary centre or outreach facilities (30–45 minutes at initial visit, 10–15 minutes at follow-up visits at 1, 6, 12, 18 and 24 months, depending on need). Education covered asthma pathophysiology, symptoms, triggers, environmental control, medications, action plans, use of equipment, devices and peak flow monitoring for those old enough. Four additional follow-up visits to local primary care providers at 3, 9, 15 and 21 months
Harish, 2001	Paediatric asthma centre	Usual care	Yes	None given
Kirk, 2001	Education and case management	Control group	Yes	None given
Lewis, 1994	Asma Control y Tratamiento Para Ninos (ACTPN)	Control group	No	Three 2-hour lectures (i.e. minimal non-active education) delivered to large groups (10–20 children and parents) covering same topics as intervention plus initial medical assessment and ongoing assistance as a result of inadequacies in routine care being identified
Sullivan, 2002	Intervention	Control	Yes	None given

HMO, health maintenance organisation.

Appendix 16

Details of providers, structure, setting and timing of interventions for children

Providers, structure, setting and timing of primarily educational interventions in children

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Alexander, 1988	Nurse-managed programme	Clinical nurse specialist	Family	1 initial then as needed, mean 2.8 visits, 3.5 phone contacts	Gradually decreasing frequency	Not stated	12 months	No	Outpatient
Collins, 1994	Inpatient education programme	Qualified nurse	Family	Minimum of 3 sessions	Not stated	Not stated	At least 24 hours	Yes – begun within 24 hours of admission	Inpatient
Cowie, 2002	Young adult asthma programme	Respiratory doctor or paediatrician, respiratory therapist, health (asthma) educator	Individual	1 + follow-up visit	Not stated	90–120 minutes	Not stated	Yes – within 6 months of ED visit	Other (specific research site)
Evans, 1987	Self-management programme (Open Airways)	Health educator	Medium group (5–15)	6	Not stated	1 hour	2–3 weeks	No	School (×6)
Fisher, 1996	Neighbourhood asthma coalition	Community resident volunteers trained as 'Change Asthma with Social Support' workers and Programme Leaders	Combination	Not stated	Not stated	Not stated	Not stated	No	Home, community (churches, city hall, health centres), other
Garrett, 1994	Community healthcare intervention	Nurse, community health worker	Individual	As needed (mean 3.7, range 1–10)	Not stated	Dependent on educational needs of patient	Until all topics had been covered	Yes – following recent attack	Home, community, other (according to patients' wishes)

continued

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Krieger, 2002	High-intensity education and environmental assessment	Community health worker, community volunteers	Family	6–9 plus as needed	2 weeks between initial visits, every 2 months after	Average 50 minutes (30–90) initial visit, average 45 minutes (20–120) follow-up visits	12 months	No	Home
	Limited education and environmental assessment	Community health worker (community home environmental specialists)	Family	1 with follow-up call	1 only	Not stated	1 visit only	No	Home
Madge, 2002	Group educational intervention	Nurse educator or trained asthma nurses	Small group (<5)	Not stated	Daily	Not stated	2 days	No	Not stated
Mitchell, 1986	Asthma education by community child health nurses	Community child health nurses	Family	6 sessions	Monthly	Not stated	6 months	Yes – following admission	Home
Shields, 1990	Educational programme	Nurse clinicians	Family	4 classes (mean 4.4 educational contacts)	Not stated	1 1/2-hour classes, 1/2-hour calls	Not stated	No	Not stated
Vazquez, 1993	Self-management education plus progressive relaxation training	Therapist (probably a psychologist)	Family	6	Weekly	1 hour	6 weeks	No	Home, outpatient
	Self-management education	Therapist (probably a psychologist)	Family	6	Weekly	1 hour	6 weeks	No	Home, outpatient
Westphal, 1984	Intercritical treatment and education	Not stated	Not stated	Not stated	Not stated	Not stated	Not stated	No	Outpatient

Providers, structure, setting and timing of self-management interventions in children

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Colland, 1993	Behavioural self-management programme	Psychologist (behavioural therapist), other trainer experienced in working with children with asthma	Medium group (5–15)	10	Weekly	1 hour	3 months	No	Not stated
Kelly, 2000	Comprehensive intervention programme	Nurse, respiratory doctor	Family	Not stated	Monthly telephone contact, follow-up at clinic at 1, 6 and 12 months	Not stated	12 months of follow-up in clinic	No	Outpatient, primary care, other
Madge, 1997	Structured asthma education and home management training programme	Specialist asthma nurse	Family	1 brief plus 2 longer sessions on ward, 1 follow-up appointment	Not stated	Total of 45 minutes	At least 2–3 weeks including follow-up appointment	Yes – within 24 hours of admission	Inpatient, outpatient
McNabb, 1985	Asthma self-management programme (AIR WISE)	Allergy clinic nurses, physician	Family	Diagnostic interview plus 4 education sessions	Weekly	30-minute interview plus 45–60-minute sessions	4–6 weeks	No	Outpatient
Ronchetti, 1997	Open Airways standard 8-week programme	Most centres used two physicians, one centre physician and psychologist, one social worker and physician	Medium group (5–15)	8	Weekly	8 weeks	No	1 hour	Outpatient

continued

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
	Open Airways shortened 4-week programme	Most centres used two physicians, one centre physician and psychologist, one social worker and physician	Medium group (5–15)	4	Weekly	1 hour	4 weeks	No	Outpatient
	Living with Asthma standard 8-week programme	Most centres used two physicians, one centre physician and psychologist, one social worker and physician	Medium group (5–15)	8	Weekly	1 hour	8 weeks	No	Outpatient
	Living with Asthma shortened 4-week programme	Most centres used two physicians, one centre physician and psychologist, one social worker and physician	Medium group (5–15)	4	Weekly	1 hour	4 weeks	No	Outpatient
Wesseldine, 1999	Structured discharge package	Trained children's asthma nurse	Family	1	Once only	20 minutes	Once only	Yes – during inpatient admission	Inpatient

Providers, structure, setting and timing of psychosocial interventions in children

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Alexander, 1972	Systematic relaxation training	Experimenters (no further details given)	Medium group (5–15)	6 sessions (required to complete minimum of 3, mean number 4.1)	2 sessions each day	20 minutes	8 days	No	Inpatient (residential centre)

continued

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Backman, 1981	Psychotherapy and family therapy	Team comprising nurse, psychologist, physiotherapist and social worker plus paediatric psychiatrist, paediatrician/ allergologist	Family	Not stated	Not stated	Not stated	Mean duration: 5 years 9 months, range 3–9 years	No	Outpatient
Dahl, 1990	Behaviour therapy	Not stated	Individual	4	Weekly	1 hour	4 weeks	No	Home, school
Davis, 1973	Jacobsonian relaxation training assisted by biofeedback	Experimenter (most likely a psychologist)	Not stated	5	Daily, rotated morning to evening	30 minutes	5 days	No	Inpatient
	Jacobsonian relaxation training alone	Experimenter (most likely a psychologist)	Not stated	5	Daily, rotated morning to evening	30 minutes	5 days	No	Inpatient
Gold, 1986	Problem-solving conflict management	Psychologist	Family	4	Weekly	1–1½ hours for group sessions, 30 minutes for individual	1 month	No	Outpatient
Gustafsson, 1988	Family therapy	Psychologist (experienced family therapist), social worker	Family	2–21 (mean 8.8)	As needed	Not stated	8 months	No	Not stated
Weder, 1994	Individual psychotherapy	Not stated	Individual	Not stated	Not stated	Not stated	3–12 months	No	Not stated
Wilkening, 1999	Standardised behavioural therapeutic group programme	Not stated	Not stated	Not stated	Not stated	Not stated	Not stated	Yes – following admission	Inpatient

Providers, structure, setting and timing of multifaceted interventions in children

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Bonner, 2002	Individualised asthma education intervention	Family coordinator (bilingual researcher with work experience in social services)	Combination	3 workshops plus 3 home visits, accompanying to doctor and calls	Monthly	Not stated	3 months	No	Home, other (unclear where workshops were held)
Catrambone, 2000	Asthma case management	Pediatric nurse specialist plus multidisciplinary team including GP, other doctors	Individual	Not stated	Not stated	Not stated	12 months	No	Home
Greineder, 1999	Asthma outreach programme (education plus follow-up)	Allergy nurse, allergy nurse practitioner, allergist	Family	1 initial session, follow-up telephone calls/visits	Follow-up weekly initially, reduced as necessary	Initial session 1–2 hours, others not specified	1 year assessed but ongoing	No	Outpatient
Griffiths, 2002	Liaison nurse intervention	Specialist asthma liaison nurse	Individual	2 visits to practice, 1 session with patient	Not stated	Not stated	Not stated	Yes – soon after emergency attendance or admission for some patients but not all	Primary care (22 intervention general practices)
Hanson, 1998	Comprehensive medical care plus education intervention (Open Airways programme)	Nurse educator, GP, physician, lay health advisors/family educators	Combination	6 clinic visits plus 4 local primary care visits, 7 group classes, 6 home visits	Clinics and group classes at baseline (×2), 1 (×2), 6, 12 and 24 months. Home visits 3–4 days after initial class, then at 2, 4, 8, 14 and 20 months. Follow-up in primary care at 3, 9, 15 and 21 months	30–45 minutes initial individual clinic visit, 10–15 minutes follow-up clinic visits depending on need; 1 h group education classes; 1–2 hour home visits	2 years	No	Home, outpatient, primary care

continued

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Harish, 2001	Paediatric asthma centre	Paediatric nurse practitioners, doctor, social worker	Family	3 outpatient visits plus home visit for most	2 weeks between visits	1 hour	6 weeks initially	Yes – following A&E visits (no details on exact timing)	Home, outpatient
Kirk, 2001	Education and case management	Not stated	Not stated	Not stated	Not stated	Not stated	Not stated	No	Home, other
Lewis, 1994	Asma Control y Tratamiento Para Ninos (ACTPN)	Physician or pharmacist for one session, rest designed for delivery by nurses, health educators or teachers	Medium group (5–15)	5	One per week	1 hour 30 minutes (1 hour children and adults separate, 30 minutes together)	5 weeks?	No	Outpatient
Sullivan, 2002	Intervention	Social worker	Combination	2 group, 1 individual for parents; 2 group for children; meetings, home visits and telephone calls as needed	Follow-up via telephone and meeting alternate months	Based on family risk profile	4 months	No	Home
Weinstein, 1998	Inpatient rehabilitation programme	Nurse, respiratory doctor, psychologist, physiotherapist	Family	4 inpatient plus outpatient as necessary	Daily child education, twice-weekly family sessions during admission plus outpatient visits as necessary (1 week to 4 months)	30-minute family sessions	8–52 days (most 20–28) inpatient, 1 year total	No	Home, inpatient, outpatient
	Outpatient rehabilitation programme	Presumably same as inpatient programme but little detail as referred to in abstract only							

Appendix 17

Details of delivery methods and tools used in interventions for children

Delivery methods and tools used in educational interventions for children

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus-sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele-phone	Written information	Video	Audio	Com-puter	
Alexander, 1988	Nurse-managed programme	Y		Y	Y					Y	Y	Y			6
Collins, 1994	Inpatient education programme		Y	Y				Y			Y				4
Cowie, 2002	Young adult asthma program		Y	Y							Y				3
Evans, 1987	Self-management programme (Open Airways)	Y	Y	Y			Y	Y	Y		Y				7
Fisher, 1996	Neighbourhood asthma coalition	Y	Y	Y	Y			Y		Y	Y				7
Garrett, 1994	Community health care intervention		Y	Y							Y				3
Krieger, 2002	High intensity education and environmental assessment	Y		Y		Y	Y		Y		Y				6
	Limited education and environmental assessment	Y				Y				Y					3
Madge, 2002	Group educational intervention		Y	Y			Y				Y				4
Mitchell, 1986	Asthma education by community child health nurses	Y		Y											2 (little detail)
Shields, 1990	Educational programme	Y		Y						Y					3
Vazquez, 1993	Self-management education plus progressive relaxation training		Y	Y	Y		Y		Y		Y		Y		7
	Self-management education		Y	Y	Y		Y								4

continued

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus-sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele-phone	Written information	Video	Audio	Com-puter	
Westphal, 1984	Intercritical treatment and education		Y												1 (little detail)
All educational studies		6	8	11	3	1	4	3	3	4	9	1	1	0	

Delivery methods and tools used in self-management interventions for children

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus-sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele-phone	Written information	Video	Audio	Com-puter	
Colland, 1993	Behavioural self-management programme		Y	Y	Y		Y	Y	Y		Y		Y		8
Kelly, 2000	Comprehensive intervention programme	Y		Y						Y	Y				4
Madge, 1997	Structured asthma education and home management training programme	Y	Y	Y						Y	Y				5
McNabb, 1985	Asthma self-management program (AIR WISE)	Y	Y	Y		Y			Y		Y				6
Ronchetti, 1997	Living with Asthma standard 8-week programme		Y	Y											2
	Living with Asthma shortened 4-Week programme		Y	Y											2

continued

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus- sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele- phone	Written information	Video	Audio	Com- puter	
	Open Airways standard 8-week programme		Y	Y	Y										3
	Open Airways shortened 4-week programme		Y	Y	Y										3
Wesseldine, 1999	Structured discharge package	Y									Y				2
All self-management studies		4	4	5	2	1	1	1	2	2	5	0	1	0	

Delivery methods and tools used in psychosocial interventions for children

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus- sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele- phone	Written information	Video	Audio	Com- puter	
Alexander, 1972	Systematic relaxation training								Y						1
Backman, 1981	Psychotherapy and family therapy		Y						Y						2
Dahl, 1990	Behaviour therapy			Y			Y		Y						3
Davis, 1973	Jacobsonian relaxation training alone			Y					Y						2
	Jacobsonian relaxation training assisted by biofeedback			Y					Y						2
Gold, 1986	Problem-solving conflict management	Y	Y	Y	Y	Y	Y		Y		Y				8

continued

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus- sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele- phone	Written information	Video	Audio	Com- puter	
Gustafsson, 1988	Family therapy		Y						Y						2
Weder, 1994	Individual psychotherapy								Y						1
Wilkening, 1999	Standardised behavioural therapeutic group programme								Y						1
All psychosocial studies		1	3	3	1	1	2	0	8	0	1	0	0	0	

Delivery methods and tools used in multifaceted interventions for children

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus- sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele- phone	Written information	Video	Audio	Com- puter	
Bonner, 2002	Individualised asthma education intervention		Y	Y			Y		Y	Y					5
Catrambone, 2000	Asthma case management		Y		Y					Y					3 (little detail)
Greineder, 1999	Asthma outreach programme (education plus follow-up)		Y	Y						Y	Y				4
Griffiths, 2002	Liaison nurse intervention		Y	Y							Y				3
Hanson, 1998	Comprehensive medical care plus education intervention (Open Airways programme)		Y	Y	Y		Y	Y			Y				6

continued

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus- sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele- phone	Written information	Video	Audio	Com- puter	
Harish, 2001	Pediatric asthma centre	Y		Y						Y				Y	4
Kirk, 2001	Education and case management	Y	Y												2 (little detail)
Lewis, 1994	Asma Control y Tratamiento Para Ninos (ACTPN)	Y	Y	Y	Y		Y	Y	Y						7
Sullivan, 2002	Intervention		Y	Y	Y					Y					4
Weinstein, 1998	Inpatient rehabilitation programme		Y	Y		Y	Y		Y		Y				6
	Outpatient rehabilitation programme		Y	Y		Y	Y		Y		Y				6
All multifaceted studies		3	9	8	4	1	4	2	3	5	4	0	0	1	

Appendix 18

Asthma-specific topics covered by interventions for children

Asthma-specific topics covered by educational interventions for children

Study	Intervention	Asthma general	Asthma management						Asthma medication				Triggers		Attendance issues
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	
Alexander, 1988	Nurse-managed programme	Y	Y	Y		Y			Y	Y	Y	Y	Y	Y	
Collins, 1994	Inpatient education programme	Y	Y	Y	Y		Y		Y	Y	Y				
Cowie, 2002	Young adult asthma programme	Y		Y	Y	Y	Y	Y for some	Y	Y	Y		Y	Y	
Evans, 1987	Self-management programme (Open Airways)	Y	Y	Y					Y				Y	Y	
Fisher, 1996	Neighbourhood asthma coalition	Y	Y	Y							Y		Y	Y	Y
Garrett, 1994	Community healthcare intervention	Y		Y	Y	Y	Y	Y for some	Y	Y			Y	Y	Y
Krieger, 2002	High-intensity education and environmental assessment	Y		Y					Y				Y	Y	
	Limited education and environmental assessment			Y									Y	Y	
Madge, 2002	Group educational intervention	Y		Y	Y				Y				Y	Y	
Mitchell, 1986	Asthma education by community child health nurses	Y		Y					Y	Y	Y		Y	Y	Y

continued

Study	Intervention	Asthma general	Asthma management						Asthma medication				Triggers		Attendance issues
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	
Shields, 1990	Educational programme	Y	Y	Y	Y						Y				Y
Vazquez, 1993	Self-management education	Y	Y	Y	Y				Y	Y	Y	Y	Y	Y	
	Self-management education plus progressive relaxation training	Y	Y	Y	Y				Y	Y	Y	Y	Y	Y	
Westphal, 1984	Intercritical treatment and education			Y											
All educational studies		11	6	12	6	3	3	2	9	6	7	2	9	9	4

Asthma-specific topics covered by self-management interventions for children

Study	Intervention	Asthma general	Asthma management						Asthma medication				Triggers		Attendance issues
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	
Colland, 1993	Behavioural self-management programme	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y
Kelly, 2000	Comprehensive intervention programme	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

continued

Study	Intervention	Asthma general	Asthma management						Asthma medication				Triggers		
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	Attendance issues
Madge, 1997	Structured asthma education and home management training programme	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	
McNabb, 1985	Asthma self-management programme (AIR WISE)	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y	
Ronchetti, 1997	Living with Asthma standard 8-week programme	Y	Y	Y	Y			Y					Y		Y
	Living with Asthma shortened 4-week programme	Y	Y	Y	Y			Y					Y		Y
	Open Airways standard 8-week programme	Y	Y	Y	Y			Y					Y		Y
	Open Airways shortened 4-week programme	Y	Y	Y	Y			Y					Y		Y
Wesseldine, 1999	Structured discharge package	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	
All self-management studies		6	6	6	6	5	4	6	5	4	4	2	5	5	3

Asthma-specific topics covered by psychosocial interventions for children

Study	Group	Asthma general	Asthma management						Asthma medication				Triggers		Attendance issues
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	
Alexander, 1972	Systematic relaxation training				Y										
Backman, 1981	Psychotherapy and family therapy												Y	Y	
Dahl, 1990	Behaviour therapy		Y	Y	Y	Y	Y	Y	Y	Y	Y				
Davis, 973	Jacobsonian relaxation training alone														
	Jacobsonian relaxation training assisted by biofeedback														
Gold, 1986	Problem-solving conflict management	Y	Y	Y	Y				Y			Y	Y	Y	
Gustafsson, 1988	Family therapy														
Weder, 1994	Individual psychotherapy														
Wilkening, 1999	Standardised behavioural therapeutic group programme														
All psychosocial studies		1	2	2	3	1	1	1	2	1	1	1	2	2	0

Asthma-specific topics covered by multifaceted interventions for children

Study	Group	Asthma general	Asthma management						Asthma medication				Triggers		Attendance issues
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	
Bonner, 2002	Individualised asthma education intervention	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Catrambone, 2000	Asthma case management	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	
Greineder, 1999	Asthma outreach programme (education plus follow-up)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y
Griffiths, 2002	Liaison nurse intervention			Y	Y	Y	Y	Y	Y	Y	Y				Y
Hanson, 1998	Comprehensive medical care plus education intervention (Open Airways programme)	Y	Y	Y	Y		Y	Y	Y	Y		Y	Y	Y	
Harish, 2001	Paediatric asthma centre	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	
Kirk, 2001	Education and case management	Y		Y	Y		Y	Y	Y	Y			Y	Y	
Lewis, 1994	Asma Control y Tratamiento Para Ninos (ACTPN)	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Sullivan, 2002	Intervention	Y		Y				Y		Y			Y	Y	

continued

Study	Group	Asthma general	Asthma management						Asthma medication				Triggers		Attendance issues
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	
Weinstein, 1998	Inpatient rehabilitation programme	Y		Y	Y		Y	Y	Y	Y	Y		Y	Y	
	Outpatient rehabilitation programme	Y		Y	Y		Y	Y	Y	Y	Y		Y	Y	
All multifaceted studies		9	6	10	9	4	9	10	9	10	7	3	9	9	4

Appendix 19

Issues indirectly related to asthma and its management covered by interventions for children

Issues indirectly related to asthma and its management covered by educational interventions for children

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Alexander, 1988	Nurse-managed programme								
Collins, 1994	Inpatient education programme							Y	Information on self-help groups and organisations
Cowie, 2002	Young adult asthma programme	Y			Y	Y		Y	Concerns or fears related to asthma; relevance of asthma in the context of career
Evans, 1987	Self-management programme (Open Airways)		Y	Y	Y			Y	Feelings about asthma; handling problems related to asthma and school; keeping physically active; encouraged children to provide information to parents
Fisher, 1996	Neighbourhood asthma coalition		Y		Y	Y		Y	Social support; tried to improve self-esteem; taught breathing techniques
Garrett, 1994	Community healthcare intervention	Y		Y		Y	Y		Assessment of social, financial and cultural beliefs
Krieger, 2002	High-intensity education and environmental assessment	Y				Y	Y		Social support; economic and social issues impacting on asthma management; financial support
	Limited education and environmental assessment								
Madge, 2002	Group educational intervention					Y			Little detail provided on content
Mitchell, 1986	Asthma education by community child health nurses							Y	Use of GP instead of A&E
Shields, 1990	Educational programme							Y	Utilisation of services and healthcare resources

continued

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Vazquez, 1993	Self-management education				Y				Information about how behavioural techniques can contribute to management; training in breathing exercises; training in visualisation of relaxing images
	Self-management education plus progressive relaxation training				Y			Y	Information about how behavioural techniques can contribute to management; training in breathing exercises; training in relaxation techniques
Westphal, 1984	Intercritical treatment and education								No details provided on content in abstract assessed
All educational studies		3	2	2	4	5	2	7	

Issues indirectly related to asthma and its management covered by self-management interventions for children

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Colland, 1993	Behavioural self-management programme		Y	Y	Y	Y			Self-efficacy; promoting positive attitudes; communication with doctors, family, peers and others
Kelly, 2000	Comprehensive intervention programme								
Madge, 1997	Structured asthma education and home management training programme								

continued

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
McNabb, 1985	Asthma self-management programme (AIR WISE)				Y	Y			Communication with family, peers, physicians and teachers, including expressing feelings about asthma; prevention of hyperventilation and need for staying calm; individualised to address barriers to self-management chosen from 25 objectives which ranked
Ronchetti, 1997	Living with Asthma standard 8-week programme					Y		Y	How to reduce social consequences of asthma (e.g. effect on sport, school and personal relationships); rational use of emergency rooms
	Living with Asthma shortened 4-week programme					Y		Y	How to reduce social consequences of asthma (e.g. effect on sport, school and personal relationships); rational use of emergency rooms
	Open Airways standard 8-week programme				Y	Y		Y	How to reduce social consequences of asthma (e.g. effect on sport, school and personal relationships); rational use of emergency rooms; barriers to management identified and addressed
	Open Airways shortened 4-week programme				Y	Y		Y	How to reduce social consequences of asthma (e.g. effect on sport, school and personal relationships); rational use of emergency rooms; barriers to management identified and addressed
Wesseldine, 1999	Structured discharge package							Y	Contact numbers for helpline and support
All self-management studies		0	1	1	3	3	0	2	

Issues indirectly related to asthma and its management covered by psychosocial interventions for children

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Alexander, 1972	Systematic relaxation training				Y				
Backman, 1981	Psychotherapy and family therapy				Y	Y			Consideration of psychiatric, psychological and social factors
Dahl, 1990	Behaviour therapy				Y	Y		Y	Asthma fears; anxiety/panic reactions; removal of secondary gains from overuse of services; assertiveness
Davis, 1973	Jacobsonian relaxation training alone				Y				
	Jacobsonian relaxation training assisted by biofeedback				Y				
Gold, 1986	Problem-solving conflict management		Y	Y	Y	Y			Difficulties in adjusting to asthma; asthma-related problems and conflict areas; feelings about asthma; asthma management practices and attitudes; relationships
Gustafsson, 1988	Family therapy			Y	Y	Y			Dysfunctional patterns of family interaction; role of asthma symptoms in family system; revealed hidden conflicts; enhanced communication about emotional impact on family members; strengthened boundaries between individuals
Weder, 1994	Individual psychotherapy				Y				Little detail on content
Wilkening, 1999	Standardised behavioural therapeutic group programme				Y				Little detail on content
All psychosocial studies		0	1	2	8	4	0	1	

Issues indirectly related to asthma and its management covered by multifaceted interventions for children

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Bonner, 2002	Individualised asthma education intervention				Y	Y			Symptom perception; communication with doctor
Catrambone, 2000	Asthma case management				Y	Y			Self-esteem and family dynamics
Greineder, 1999	Asthma outreach programme (education plus follow-up)	Y							
Griffiths, 2002	Liaison nurse intervention								
Hanson, 1998	Comprehensive medical care plus education intervention (Open Airways programme)	Y				Y			Social support
Harish, 2001	Paediatric asthma centre								
Kirk, 2001	Education and case management								Little detail on content
Lewis, 1994	Asma Control y Tratamiento Para Ninos (ACTPN)	Y	Y	Y	Y	Y	Y		Emotions related to asthma; breathing and relaxation exercises to reduce anxiety and panic during attack
Sullivan, 2002	Intervention	Y			Y	Y			Improve communication between family and physician

continued

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Weinstein, 1998	Inpatient rehabilitation programme			Y	Y	Y			Psychological issues included knowledge, attitudes, beliefs, maladaptation, hyperventilation. Social issues included dysfunctional family relationships and behaviours, over-protectiveness, ineffective discipline
	Outpatient rehabilitation programme			Y	Y	Y			Psychological issues included knowledge, attitudes, beliefs, maladaptation, hyperventilation. Social issues included dysfunctional family relationships and behaviours, over-protectiveness, ineffective discipline
All multifaceted studies		4	1	2	5	6	1	0	

Appendix 20

Methodological quality characteristics of studies in children

Quality characteristics of randomised controlled trials in children

	Randomisation			Outcome assessment			Sample and attrition								Analysis and reporting		
Study	Method	Concealed?	Concealment method	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria?	Power calculation	Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Alexander, 1988	Not stated	No	Not stated	No	Yes – in results	Yes – one only	21	Yes	No	Not stated	Yes – mean hospital days higher in control, not adjusted for	No	100	No	Yes	No – but actually done	Yes
Bonner, 2002	Not stated	No	Not stated	Yes	No	Yes – one only	119	Yes	No	28	Yes – similar	No	84	Yes – similar	Yes	No	Yes
Catrambone, 2000	Not stated	No	Not stated	No	Yes – pre-specified	Yes – in results	37	No	Yes	79	Yes – similar	No	76	No	Yes	Yes	Yes
Colland, 1993	Not stated	No	Not stated	No	No	No	112	Yes	No	Not stated	Yes – similar	No	Not stated	No	Yes	No	No
Cowie, 2002	Not stated	Yes	Centrally generated	No	Yes – pre-specified	Yes – pre-specified	62	Yes	Yes	37	Yes – minor differences	Yes – similar	67	Yes – similar	Yes	Yes – but not actually done	Yes
Dahl, 1990	Not stated	No	Not stated	No	No	Yes – one only	20	Yes	No	Not stated	Yes – lower absenteeism in controls, not adjusted for	No	Not stated	No	Yes	No	No
Evans, 1987	Not stated	No	Not stated	Yes	No	Yes – one only	239	Yes	No	82	Yes – slightly worse classroom behaviour and better self-management in controls adjusted for	No	77	No	Yes	No	Yes

continued

Study	Randomisation			Outcome assessment			Sample and attrition							Analysis and reporting		
	Method	Concealed?	Concealment method	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria?	Power calculation	Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Garrett, 1994	Not stated	No	Not stated	Yes	No	Yes – one only	500	Yes	Yes	51	Yes – similar	Yes – non-participants younger but admission rates similar	>90	Yes – similar	Yes	Yes – for some outcomes	No
Gold, 1986	Not stated	No	Not stated	No	No	No	18	Yes	No	38	Yes – differences in age, gender, ethnicity, not adjusted for	No	Unclear, drop-outs replaced	No	Yes	No	No
Greineder, 1999	Random number table	No	Not stated	No	No	Yes – one only	57	Yes	No	100	Yes – similar	No	100	No	Yes	No – but actually done	Yes
Griffiths, 2002	Computer generated	No	Not stated	Yes	Yes – pre-specified	Yes – in 164 results		Yes	Yes	48	Yes – similar	Yes – fewer children and more whites amongst non-participants	98	No	Yes	No – but actually done	Yes
Gustafsson, 1988	Not stated	No	Not stated	Yes	No	No	17	Yes	No	85	No	No	59	No	Yes	Yes	No
Hanson, 1998	Coin toss	No	Not stated	No	No	No	303	Yes	No	Not stated	Yes – differences in ethnicity and language, not adjusted for, differences in age adjusted for	No	52	Yes – American Indians more likely to drop out	Yes	No	No

continued

	Randomisation			Outcome assessment			Sample and attrition								Analysis and reporting		
Study	Method	Concealed?	Concealment method	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria?	Power calculation	Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Harish, 2001	Patient birth date	No	Not stated	Yes	Yes – in results	No	129	No	Yes	43	Yes – similar	No	Inclusion based on follow-up	Yes – less severe more likely to drop out	Yes	No	Yes
Krieger, 2002	Not stated	No	Not stated	Yes	No	Yes – one only	274	No	No	77	No	No	82	No	No	No	No
Lewis, 1994	Random number table	No	Not stated	No	No	Yes – in results	138	Yes	No	92	Yes – similar	No	90	No	Yes	No	Yes
Madge, 1997	Drawing cards	No	Not stated	No	Yes – pre-specified	Yes – one only	201	Yes	No	71	Yes – age differences adjusted for	Yes – similar	63	Yes	Yes	No – but actually done for one outcome	Yes
Madge, 2002	Not stated	No	Not stated	No	No	No	100	No	No	Not stated	No	No	Not stated	No	No	No	No
McNabb, 1985	Coin toss	No	Not stated	No	Yes – pre-specified	Yes – in results	16	Yes	No	Not stated	Yes – similar	No	88	No	Yes	No	No
Mitchell, 1986	Not stated	No	Not stated	No	No	No	168	Yes	No	Not stated	No	No	54	Yes -– ethnic minority more likely to drop out	No	No – but actually done	Yes
Ronchetti, 1997	Not stated	No	Not stated	Yes	Yes – in results	Yes – one only	67	No	No	Not stated	Yes – similar	No	67	Yes – similar	Yes	No	Yes
Shields, 1990	Random number table	No	Not stated	No	No	No	253	Yes	No	100	Yes – similar	No	77	Yes – similar	No	No – but actually done	Yes

continued

Study	Randomisation			Outcome assessment			Sample and attrition						Analysis and reporting		
	Method	Concealed?	Concealment method	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria?	Power calculation	Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Sullivan, 2002	Not stated	No	Not stated	Yes	Yes – pre-specified	Yes – in results	1033	Yes	Yes	86	Yes – similar	Yes – lower medication use in non-participants	93	No	Yes	Yes	Yes
Wesseldine, 1999	Computer generated	Yes	Serially numbered envelopes	Yes	Yes – pre-specified	Yes – pre-specified	160	Yes	Yes	Not stated	Yes – similar	No	83	No	Yes	No – but actually done for some outcomes	Yes
Wilkening, 1999	Date of admission	No	Not stated	No	No	Yes – one only	56	No	No	Not stated	No	No	Not stated	No	No	No	No

Quality characteristics of controlled clinical trials in children

	Outcome assessment			Sample and attrition								Analysis and reporting		
Study	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria?	Power calculation	Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Alexander, 1972	No	Yes – in results	Yes – in results	44	Yes	No	Not stated	Yes – similar	No	82	No	Yes	No	No
Davis, 1973	No	No	Yes – one only	12	Yes	No	Not stated	Yes – similar	No	100	No	Yes	No	No
Kelly, 2000	Yes	No	Yes – one only	80	Yes	No	78	Yes – more controls on anti-inflammatory medication, not adjusted for	No	98	No	Yes	No	No
Vazquez, 1993	No	No	No	12	Yes	No	87	Yes – differences in self-management and attacks intensity adjusted for	No	Not stated	No	Yes	No	No

Quality characteristics of controlled observational studies in children

		Outcome assessment			Sample and attrition								Analysis and reporting		
Study	**Selection of groups**	**Blinded?**	**Single primary outcome?**	**Single primary endpoint?**	**Total sample size**	**Clear selection criteria?**	**Power calculation**	**Participation rate (%)**	**Checked baseline comparability of groups?**	**Checked comparability of non-participants?**	**Minimum follow-up (%)**	**Checked comparability of withdrawals?**	**Provided details of analysis?**	**Specified ITT analysis?**	**Adequate outcome reporting?**
Collins, 1994	Prospective follow-up of groups, comparison group comprised convenience community sample	No	No	Yes – one only	20	No	No	Not stated	No	No	72	No	No	No	No
Fisher, 1996	Control group from adjacent area within boundary of hospital service, both groups followed prospectively	No	No	Yes – one only	249	Yes	No	72	Yes – similar	No	88	No	Yes	No	No
Weder, 1994	Intervention group appeared to be followed prospectively, historical control group from previous study	No	No	No	26	Yes	No	Not stated	Yes – similar	No	Not stated	No	No	No	No
Westphal, 1984	Assessment of children exposed to (1) outpatient treatment and education, (2) outpatient treatment only, (3) emergency treatment only; unclear whether assigned to groups and whether one or more groups followed prospectively or identified retrospectively	No	No	Yes – one only	Not stated	No	No	Not stated	No	No	Not stated	No	No	No	No
Backman, 1981	Two groups identified on basis of whether referred for psychotherapy and family therapy or not, unclear whether assigned to groups and whether one or both groups followed prospectively or identified retrospectively	No	Yes – in results	Yes – one only	47	No	No	100	Yes – intervention group more severe, not adjusted for	No	79	No	No	No	No

continued

		Outcome assessment			Sample and attrition								Analysis and reporting		
Study	**Selection of groups**	**Blinded?**	**Single primary outcome?**	**Single primary endpoint?**	**Total sample size**	**Clear selection criteria?**	**Power calculation**	**Participation rate (%)**	**Checked baseline comparability of groups?**	**Checked comparability of non-participants?**	**Minimum follow-up (%)**	**Checked comparability of withdrawals?**	**Provided details of analysis?**	**Specified ITT analysis?**	**Adequate outcome reporting?**
Kirk, 2001	Control group identified retrospectively from local hospitals, unclear how intervention group identified	No	No	Yes – one only	84	Yes	No	Not stated	Yes – ED visits, hospitalisations, days hospitalised higher in intervention, not adjusted for	No	Not stated	No	No	No	Yes
Weinstein, 1998	Inpatient and outpatient groups matched by 1 year prior morbidity, unclear whether one or both groups followed prospectively or identified retrospectively	No	No	Yes – one only	33	Yes	No	100	Yes – higher use of inhaled steroids in outpatient group, small differences in health services use, not adjusted for	No	100	No	No	No	No

Appendix 21

Outcomes assessed in controlled observational studies in children

Numbers of controlled observational studies reporting outcomes of different types

Type of outcome	Number of studies reporting		
	CPOS	CROS	Total
Admission/readmission	1	2	3
Medication use	1	2	3
Self-care behaviour	2	1	3
Knowledge	2	1	3
A&E/ED attendance	0	2	2
Severity[a]	1	1	2
Beliefs/attitudes	2	0	2
Other unscheduled healthcare attendance	1	0	1
Respiratory function	1	0	1
Scheduled healthcare attendance	0	1	1
Absenteeism	0	1	1
Psychological morbidity	0	1	1
Exacerbations	0	1	1
Symptoms/asthma control	0	0	0
Health status/QoL	0	0	0
Self-efficacy/perceived control	0	0	0
Satisfaction	0	0	0
Social support	0	0	0
Death	0	0	0
Other	1	0	1

[a] Identified after reporting of results as a primary outcome by one or more studies.

Appendix 22

Quality characteristics of economic studies in children

No.	*BMJ* Referees' Checklist	Alexander, 1988	Greineder, 1999	Harish, 2001	Kelly, 2000	McNabb, 1985	Shields, 1990	Sullivan, 2002	Weinstein, 1998
	Study design								
1	The *economic* research question is stated		Y					Y	
2	The economic importance of the research question is stated	Y	Y		Y			Y	
3	The viewpoint(s) of the analysis are clearly stated and justified				Y			Y	
4	The rationale for choosing the alternative programmes or interventions compared is stated	Y	Y	Y	Y	Y	Y	Y	Y
5	The alternatives being compared are clearly described		Y	Y	Y	Y	Y	Y	
6	The form of economic evaluation used is stated							Y	
7	The choice of form of economic evaluation is justified in relation to the questions addressed		Y					Y	
	Data collection								
8	The source(s) of effectiveness estimates used are stated	Y	Y	Y	Y	Y	Y	Y	Y
9	Details of the design and results of effectiveness study are given (if based on a single study)	Y	Y	Y	Y	Y	Y	Y	Y
10	Details of the method of synthesis or meta-analysis of estimates are given (if based on an overview of a number of effectiveness studies)								
11	The primary outcome measure(s) for the economic evaluation are clearly stated		Y	Y	Y	Y		Y	
12.	Methods to value health states and other benefits are stated								
13.	Details of the subjects from whom valuations were obtained are given								
14	Productivity changes (if included) are reported separately								
15	The relevance of productivity changes to the study question is discussed						Y	Y	
16	Quantities of resources are reported separately from their unit costs	Y	Y	Y	Y	Y		Y	Y
17	Methods for the estimation of quantities and unit costs are described	Y	Y					Y	Y
18	Currency and price data are recorded	Y					Y	Y	
19	Details of currency of price adjustments for inflation or currency conversion are given								
20	Details of any model used are given								
21	The choice of model used and the key parameters on which it is based are justified								
	Analysis and interpretation of results								
22	Analysis and interpretation of results								
23	Time horizon of costs and benefits is stated	Y	Y	Y		Y	Y	Y	Y
24	The discount rate(s) is stated							Y	
25	The choice of rate(s) is justified								
26	An explanation is given if costs or benefits are not discounted								

continued

No.	*BMJ* Referees' Checklist	Alexander 1988	Greineder 1999	Harish 2001	Kelly 2000	McNabb 1985	Shields 1990	Sullivan 2002	Weinstein 1998
27	Details of statistical tests and confidence intervals are given for stochastic data		Y					Y	
28	The approach to sensitivity analysis is given							Y	
29	The choice of variables for sensitivity analysis is justified							Y	
30	The ranges over which the variables are varied are stated							Y	
31	Relevant alternatives are compared							Y	
32	Incremental analysis is reported							Y	
33	Major outcomes are presented in a disaggregated as well as aggregated form	Y	Y		Y	Y		Y	Y
34	The answer to the study questions given		Y	Y		Y		Y	Y
35	Conclusions follow from the data reported	Y	Y		Y	Y	Y	Y	
36	Conclusions are accompanied by the appropriate caveats		Y		Y	Y	Y	Y	
	Number of 'Yes'	10	16	8	11	11	9	26	8

Appendix 23

Cost and cost-effectiveness data for studies in children

All studies used US$ as the currency. All studies reported costs over a period of 12 months follow-up from the start of the intervention, except the Sullivan and Harish studies, which reported costs over 24 months of follow-up from the start of the intervention (i.e. 1 year after the end of the intervention).

	Alexander, 1988	Greineder, 1999	Harish, 2001	Kelly, 2000	McNabb, 1985	Shields, 1990	Sullivan, 2002	Weinstein, 1998
Intervention	Clinical nurse specialist	Full Asthma Outreach Programme	Referral from emergency department to multidisciplinary asthma clinic with tailored care review plus education with home visits	Tertiary clinic asthma education and outreach nurse follow-up	Tailored education programme in HMO	Education by classes and phone for patients and parents	Social worker-led community-based tailored education programme including home visits	Outpatient rehab.
Comparator	Usual paediatric follow-up after ED visit	Asthma Outreach Programme nurse-led class	Usual healthcare for children attending ED	Usual care at same clinic	Usual care in HMO	Usual care in HMO	Usual healthcare for children in 7 inner-city areas	Inpatient rehab.
Price year	1985	<1999	<2000	1995 for intervention cost	<1985	1984	1995	<1998
Number in intervention group for economic analysis	11	29	151 (60 follow-up), 59 patients compared retrospectively in year before-and-after for costs	38	7	101	515	11
Number in control group for economic analysis	10	28	149 (68 follow-up) for outcomes but no cost data	40	7	104	518	22
Intervention cost per intervention patient	Not reported	Not reported	$500,000 per year for 800 patients (i.e. $625 per case)	12 hours per week, $15,000 per year for all patients	$180	$96	Mean: personnel including training $95, pest control visits $80, skin test $60, equipment $86, other $20	Outpatient rehab. mean charge $5,781; inpatient rehab. mean charge $23,877

continued

	Alexander, 1988	Greineder, 1999	Harish, 2001	Kelly, 2000	McNabb, 1985	Shields, 1990	Sullivan, 2002	Weinstein, 1998
Healthcare costs excluding intervention costs per intervention patient	Not reported [mean ED visits 0.6 (SD 0.9)]	Not reported	Not reported	Not reported	Not reported	Not reported [ED visits 55/101, mean hospital days. 0.27 (SD 1.34), mean office visits 1.63 (SD 2.28)]	Not reported	Mean year before $6734 (SD $6317); mean year after $2395 (SD $2020)
Healthcare costs plus intervention costs per intervention patient	Not reported	Outside plan use: mean before $2692 (SE $589) $471; mean after (SE $245)	Not reported	Before $2983, after $2262	$418	Not reported	Direct medical costs $2589	Not reported
Healthcare costs per control patient	Not reported [mean ED visits 2.6 (SD 1.1)]	Outside plan use: mean before $2266 (SE $484); mean after $1638 (SE $834)	Not reported	Before $2955, after $2777	$925	Not reported [ED visits 39/104, mean hospital days 0.22 (SD 0.74), mean office visits 1.86 (SD 4.24)]	Direct medical costs $2345	Mean year before $7053 (SD 5640); mean year after $4072 (SD 2867)
Difference in healthcare costs per patient excluding intervention costs	$3300	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Difference in healthcare costs per patient including intervention costs	Not reported	Not reported	21 fewer admissions, 53 fewer ED visits: $77654 savings (i.e. ↓$1316 per case)	↓$515	↓$507	Not reported	↑$245	Not reported
Unit costs	ED visit: $150	Not reported	Hospital admission: $3800 ED visit: $118	Not reported	Asthma emergency treatment: $125	Not reported	For all patients mean cost ED visit $325; hospital day $840; ICU day $1050; physician visit $34	Outpatient rehab. per day: $1200 Inpatient rehab. per day: $1700

continued

Study	Alexander,1988	Greineder, 1999	Harish, 2001	Kelly, 2000	McNabb, 1985	Shields, 1990	Sullivan, 2002	Weinstein, 1998
Measures of health benefit	ED visits	ED visits, admissions	Not reported	Asthma events, QoL, health service use	Knowledge, self-management behaviour, medications, health service use	Respiratory-related healthcare utilisation	Symptom-free days	Health service and medication use (morbidity)
Cost-effectiveness estimates	Not reported	$11.67 saved for every dollar spent on Asthma Outreach Programme nurse; $7.69 taking account of regression to the mean	Net savings based on before after comparison	No difference in admissions, ED visits reduced, QoL (subset) better. Asthma charges decreased	Cost savings from reduced utilisation net of cost of intervention estimated	No difference in outcomes, cost-effectiveness not reported	$9.2 per symptom-free day (SFD) gained (95% CI –$12.56 to 55.29)	Not reported
Authors' conclusions about cost-effectiveness	"This study suggests that it is possible for nurses to intervene to improve the standard of care while contributing to cost containment"	"Substantial savings were achieved compared with cost of the Asthma Outreach Programme nurse"	"It is likely that we are saving the health care system more than $500,000 annually. We conclude that a comprehensive approach to asthma care in the inner city may significantly reduce the costly use of the emergency department, and may also reduce the rate of asthma-related hospitalizations"	"A comprehensive asthma intervention program for Medicaid insured asthmatic children can significantly improve health outcomes while reducing health-care costs" [NB: does not include cost of intervention]	Potential for further savings in subsequent years	"It is possible that the intervention had a positive impact on … days lost from school or sick days. These measures should be included in future research"	"A multi-faceted program with trained social workers deployed as ACs [asthma counsellors] reduced symptom days, was cost effective overall and was cost saving in children with more severe disease" "… end point complies with NAEPP recommendations on economic appraisal in asthma, but the direct policy implications of a symptom based end point in asthma are less clear"	"Compared to IN rehab, OUT rehab has comparable morbidity outcomes with minimal rehab follow-up and clear economic advantages"

HMO, health maintenance organisation; SE, standard error of the mean.

Appendix 24

Summary characteristics of controlled studies in adults reviewed in depth

Ordered by degree of targeting of difficult asthma, type of intervention, study design and then alphabetically by author.

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Mayo, 1990[429]	Definite	Multiple hospitalisations or A&E attendances PLUS low-SES ethnic minority area, labelled 'difficult'	Multifaceted	Education, self-management, open-door policy, medical treatment	RCT	Admission/readmission, A&E/ED attendance	Yes
Kelso, 1996[430]	Definite	Moderate–severe asthma PLUS ethnic minority AND multiple hospitalisations OR A&E attendances OR one or more ICU admission	Multifaceted	Education, self-management, medical treatment	CPOS	Admission/readmission, A&E/ED attendance, Symptoms/asthma control, Health status/QoL, Psychological morbidity	No
Kelso, 1995[431]	Definite	Moderate–severe asthma PLUS ethnic minority AND multiple hospitalisations OR A&E attendances OR one or more ICU admission	Multifaceted	Education, self-management, medical treatment	CPOS	Admission/readmission, A&E/ED attendance, Medication use, Self-care behaviour, Knowledge	Yes
Ford, 1997[432,474,475]	Probable	A&E attendance PLUS ethnic minority subgroup AND non-compliant subgroup	Education	Education, basic relaxation training	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Exacerbations, Health status/QoL, Knowledge, Beliefs/attitudes	Yes
Blixen, 2001[433,434]	Probable	Hospitalisation PLUS ethnic minority	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Scheduled healthcare attendance, Symptoms/asthma control, Health status/QoL, Psychological morbidity, Self-care behaviour	No
Ago, 1980[435]	Probable	Severe, intractable asthma	Psychosocial	Psychosomatic treatment	CROS	Psychological morbidity, Other	No
Groen, 1960[436]	Probable	Hospitalised for severe attack PLUS most many admissions and severe intractable asthma	Psychosocial	Psychotherapy	CROS	Death, Respiratory function, Symptoms/asthma control, Other	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
George, 1999[437]	Probable	Hospitalisation PLUS low-SES and ethnic minority area	Multifaceted	Education, self-management, addressing socio-economic barriers via social worker, additional follow-up	RCT	Admission/readmission, A&E/ED attendance, Scheduled healthcare attendance	No
Mildenhall, 1998[438,439]	Probable	Severe asthma OR hospitalisation PLUS non-compliant	Multifaceted	Education, self-management, psychological supervision, social support, referral	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Medication use, Symptoms/asthma control, Absenteeism, Health status/QoL, Psychological morbidity, Self-care behaviour, Self-efficacy/perceived control, Social support	Yes
Zimmermann, 2000[440]	Probable	Hospitalisation PLUS more than one additional hospitalisation or A&E attendance in past year PLUS most ethnic minority	Multifaceted	Education, self-management, social support, optimisation of medications	RCT	Admission/readmission, A&E/ED attendance, Absenteeism, Health status/QoL, Beliefs/attitudes, Self-efficacy/perceived control	Yes
Garrett, 1994[404]	Possible	Area of low SES PLUS A&E attendance OR hospitalisation OR severe	Education	Education, link to GP/referral	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Scheduled healthcare attendance, Medication use, Respiratory function, Severity, Symptoms/asthma control, Absenteeism, Health status/QoL, Psychological morbidity, Self-care behaviour, Social support, Other	No
Brewin, 1995[441]	Possible	Hospitalisation	Education	Education, some elements of self-management	CPOS	Exacerbations, Symptoms/asthma control, Absenteeism, Knowledge, Other	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Morice, 2001[442,443]	Possible	Hospitalisation for severe asthma	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Other unscheduled healthcare attendance, Medication use, Severity, Symptoms/asthma control, Self-care behaviour, Knowledge, Other	No
Osman, 2002[444,445]	Possible	Hospitalisation	Self-management	Education, self-management	RCT	Admission/readmission, Symptoms/asthma control, Satisfaction	No
Yoon, 1993[446,53]	Possible	Hospitalisation for severe asthma	Self-management	Education, self-management	RCT	Admission/readmission, A&E/ED attendance, Respiratory function, Severity, Symptoms/asthma control, Absenteeism, Psychological morbidity, Self-care behaviour, Knowledge, Beliefs/attitudes	No
Bowler, 1998[447]	Possible	Substantial medication use	Psychosocial	Buteyko breathing retraining techniques	RCT	Admission/readmission, Medication use, Respiratory function, Symptoms/asthma control, Health status/QoL	No
Manocha, 2002[448]	Possible	Symptomatic on inhaled steroids	Psychosocial	Yoga (control group relaxation, cognitive behavioural therapy exercises, discussion)	RCT	Medication use, Respiratory function, Symptoms/asthma control, Health status/QoL, Psychological morbidity	No
Parry, 2002[449,450]	Possible	High anxiety or panic fear	Psychosocial	Cognitive–behavioural therapy	RCT	Symptoms/asthma control, Health status/QoL, Psychological morbidity, Self-efficacy/perceived control	Yes
Ciurluini, 1993[451]	Possible	Recurrent asthma exacerbations not linked to allergies (i.e. intrinsic)	Psychosocial	Biofeedback	CCT	Exacerbations, Psychological morbidity	No

continued

Study	Targeting of difficult asthma	Patients	Intervention type	Intervention components	Study design	Types of outcomes assessed	Including costs?
Ross, 2002[452]	Possible	Panic disorder	Psychosocial	Cognitive–behavioural treatment, education	CCT	Respiratory function, Symptoms/asthma control, Health status/QoL, Psychological morbidity, Self-efficacy/perceived control	No
White, 2001[453–456]	Possible	Hospitalised subgroup	Multifaceted	Education, self-management, coordination of care, liaison with and education of primary care professionals	RCT	Admission/readmission	Yes
Gibson, 1995[457]	Possible	Hospitalisation	Multifaceted	Education, self-management, medical treatment	CROS	Admission/readmission, Respiratory function, Severity, Symptoms/asthma control, Self-care behaviour, Knowledge	No

Appendix 25

Details of patients in studies of adults

Details of patients in adult studies with definite targeting of difficult asthma

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age (years)	Asthma	Other	
Kelso, 1995	Targeted African-Americans with multiple hospitalisations or emergency attendances and moderate–severe asthma. African-Americans have three times the mortality rate for asthma, and this is similar for other ethnic minorities. Many ethnic minority patients use the ED as their main source of care; African-Americans are the main users of the ED in Memphis	18+	Diagnosis of asthma as per ATS criteria; admitted to ED with diagnosis of acute asthma; 5+ ED visits in last 2 years, 3+ ED visits in last year, 2+ hospitalisations in last 2 years OR an ICU admission in last 2 years	African-American	Chronic bronchitis, emphysema or other chronic pulmonary disease; significant cardiac disease; psychosis or substance abuse; pregnancy; inability to use peak flow or metered dose inhaler with spacer correctly
Kelso, 1996	Targeted African-Americans with multiple hospitalisations or emergency attendances and moderate–severe asthma. Asthma morbidity and mortality higher in African-Americans	18+	Meeting NAEPP criteria for moderate–severe asthma; 5+ ED visits in last 2 years, 3+ ED visits in last year, 2+ hospitalisations in last 2 years OR an ICU admission in last 2 years	Presumably African-American but not explicitly stated	COPD; clinically significant cardiac disease; psychosis, substance abuse; pregnancy; inability to use peak flow meter or inhaler with spacer correctly
Mayo, 1990	Lower East Side of New York densely populated, socio-economically depressed area. Asthma common cause for admission (670/year). Certain patients have frequent admissions and of these strict criteria applied for inclusion in the study. Most patients labelled as 'difficult'	18+	Primary diagnosis of acute asthma exacerbation (as per ATS definition) with >4 ER visits in last 12 months or >1 hospitalisation in last 24 months	None	Mild asthma; remote residence or in prison, deaf mute; intravenous drug abusers; overt central nervous system/mental illness; severe alcoholism; private follow-up; discharged before evaluation in hospital

ATS, American Thoracic Society.

Details of patients in adult studies with probable targeting of difficult asthma

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age (years)	Asthma	Other	
Ago, 1980	Intractable asthma but no explicit discussion of at-risk status	Adults	Intractable asthma, defined as severe, all-year-round asthma which cannot be alleviated by normal treatment and interferes with daily life without steroid administration	Treated at least 3 months in Department of Psychosomatic Medicine	None
Blixen, 2001	Asthma deaths more common among African-Americans (more than double the rate of Caucasians), hospitalisation rates also higher amongst inner-city, low-income African-Americans. Representative of those with severe asthma who are at risk	18–50	Hospitalised overnight with a primary diagnosis of asthma	African-American	None
Ford, 1997	Focus of reanalysis on African-American subgroup from previous study since asthma death rates twice as high among African-Americans (86% of deaths amongst African-Americans in one study), morbidity and treatment costs also disproportionately high	18–70	Seen in ED	African-American subgroup (72% of sample)	<18 or >70 years; language barriers; psychiatric barriers
George, 1999	Disproportionate morbidity and mortality in indigent, inner city patients due to allergens, smoking and psychosocial factors. Excessive morbidity strongly correlates with poverty and urban residence	18–45	Admitted from ED with (uncomplicated) acute exacerbation	Area around hospital predominantly populated by African-Americans	Patients admitted to ICU; inability to speak English; co-morbid disease; absence of telephone; pregnancy
Groen, 1960	Targeted patients admitted at least once for severe status asthmaticus and most had many admissions for this	Not stated (but appear to be adults)	Admitted at least once for severe status asthmaticus, most many admissions and very severe	None	None

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age (years)	Asthma	Other	
Mildenhall, 1998	Severe asthma plus failed attendance at outpatient appointments or non-compliance with recommended asthma management means patients at risk from adverse asthma outcomes	Adults (attending adult clinic)	BTS Step 4 or 5 treatment AND/OR previous admissions for asthma	Repeated failed attendances at asthma clinics AND/OR non-compliance with medication, changes in medication or peak flow monitoring	None
Zimmermann, 2000	Targeted patients hospitalised who had a history of one or more hospitalisations or ED visits in the last year, defined as high risk	Adults	Hospitalised for asthma with a history of one or more additional hospitalisations or ED visits in the last year	None	None

BTS, British Thoracic Society.

Details of patients in adult studies with possible targeting of difficult asthma

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age (years)	Asthma	Other	
Bowler, 1998	Targeted patients taking substantial doses of asthma medication but no explicit discussion of at-risk status	12–70	History of asthma and taking substantial doses of asthma medication (> 1400 μg short acting beta-agonist or equivalent nebulised or long acting beta-agonist in last week)	None	Change in inhaled steroid dose or use of oral steroids in last month; other unstable medical conditions; had undertaken Buteyko previously
Brewin, 1995	Patients admitted to hospital with asthma need opportunity to learn more about asthma so can be independent and as symptom-free as possible	>16	Admitted to hospital with asthma	None	None

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age (years)	Asthma	Other	
Ciurluini, 1993	Targeted patients with recurring asthmatic crises who were affected by psychological factors. Psychological factors complicate asthma	18–40	'Intrinsic' asthma negative to allergy tests; recurrent crises not linked to seasons.	None	None
Garrett, 1994	Targeted patients attending A&E with acute asthma and living within a defined geographic area of high emergency room users. In this area of high social and medical needs with large immigrant population, mortality and admissions rates for asthma highest in Auckland. Rates four times higher in Pacific Islander ethnic minority groups, also higher in Maoris mainly owing to lack of self-management skills, social factors and non-attendance	2–55	Acute asthma diagnosed by doctor whilst attending emergency room	Lived within a defined geographic area with high A&E use and intended to reside locally for next 9 months; understood English sufficiently; could be contacted within 5 days of attending	None
Gibson, 1995	Morbidity and readmission rates following acute severe asthma are excessively high	Adults	Asthma admission	None	None
Manocha, 2002	Remained symptomatic on moderate to high doses of inhaled steroids	16+	History of symptoms for >1 year; at least moderate to severe asthma on basis of score >7 on 0–12 symptom/control scale, airways responsiveness, bronchodilator response, moderate–high-dose inhaled steroids; stable treatment last 6 weeks; symptomatic on moderate–high-dose inhaled steroids	None	Exacerbation or respiratory infection in preceding 6 weeks; could not communicate in English; smoking; pregnant/lactating women

continued

Study	Discussion of at-risk status	Inclusion criteria			Exclusion criteria
		Age (years)	Asthma	Other	
Morice, 2001	Inadequate self-management contributes to mortality and morbidity. Written management plans are a positive step but usefulness dependent upon identifying and targeting those asthmatics most at risk	16–72	Admitted to hospital with primary diagnosis of acute asthma	None	Unable or unwilling to complete follow-up questionnaires; underlying COPD; previous participation in an educational programme from a hospital-based asthma nurse
Osman, 2002	After acute asthma admission there is a high rate of readmission: 1 in 5 patients readmitted	14–60	Confirmed diagnosis; admitted with acute asthma	None	None
Parry, 2002	High panic/fear linked to high service use and morbidity in asthma	18–65	Clinical diagnosis of asthma	Above threshold for clinical anxiety on Hospital Anxiety and Depression Scale or panic–fear on Asthma Symptom Checklist	Psychiatric disorder; heart failure or angina; co-existent significant lung disease
Ross, 2002	Women with asthma and panic disorder targeted. Higher than normal prevalence of panic disorder in asthmatics. Autonomic arousal associated with high anxiety and panic disorder can exacerbate or trigger symptoms and makes self-maintaining and management difficult	Adults	Confirmed diagnosis of asthma and panic disorder	Women only?	None
White, 2001	Targeted patients admitted with asthma. 20% of admitted patients likely to be readmitted within 6 months	15–60	Patients in 40 of the local general practices with the highest number of acute admissions per GP; admitted patients subgroup	Within Lewisham University Hospital catchment area	None
Yoon, 1993	Targeted patients recently discharged from hospital after a severe exacerbation of asthma	16–65	Confirmed diagnosis by history and reversibility of airflow obstruction; admitted with severe exacerbation	Able to attend education centre; literate in English	Signs of irreversible airways obstruction, e.g. due to smoking; significant concurrent disease

Appendix 26

Control groups for studies in adults

Details of control groups in studies of primarily education interventions for adults

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Brewin, 1995	Patient education	Control group	Yes	All other patients admitted with asthma to hospitals in the district. Survey of usual care suggests these in receipt of minimal education
Ford, 1997	Educational intervention	Control group	Yes	Admitted to and discharged from A&E with usual care and follow-up
Garrett, 1994	Community healthcare intervention	Usual care	Yes	Usual management by physicians with referral to hospital asthma clinic for some patients

Details of control groups in studies of self-management interventions for adults

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Blixen, 2001	Nurse-run asthma education programme	Control group	Yes	None given
Morice, 2001	Education programme	Routine care	Yes	Routine care from medical and nursing staff
Osman, 2002	Self-management programme	Standard care	Yes	Standard care by more than 40 general medical and respiratory physicians, usually including follow-up in an outpatient clinic at discretion of physician as per BTS guidelines and local practice. Could include education or use of management plans
Yoon, 1993	Education programme	Waiting list control group	Yes	88% of all patients received specialist follow-up care and most received some education including instruction in medication by clinical pharmacist before discharge, instruction in use of PEF meter and chart for recording

Details of control groups in studies of psychosocial interventions for adults

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Ago, 1980	Psychosomatic treatment	Control group	No	Consisted of patients who terminated psychosomatic treatment at first stage, which comprised general medical assessment and treatment with emphasis on patient–doctor relationship and increasing motivation for psychosomatic treatment. Average treatment duration of 19.5 (±11.5) months
Groen, 1960	Group psychotherapy	Patients treated with symptomatic therapy and ACTH	No	Treatment from 3 months to 4 years with ACTH, cortisone or prednisone.
		Patients treated with symptomatic therapy only	Yes	None given
Parry, 2002	Cognitive behaviour therapy	Control group	Yes	None given
Ross, 2002	Cognitive–behavioural treatment and asthma education	Delayed treatment control	Yes	None given

ACTH, adrenocorticotrophic hormone.

Details of control groups in studies of multifaceted interventions for adults

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
George, 1999	Comprehensive inpatient educational programme	Routine care	Yes	Inpatient treatment including nebulised albuterol and intravenous methylprednisolone sodium; education, PEF measurement as needed
Gibson, 1995	Asthma management service	Patients not referred to service	Yes	None given
Kelso, 1995	Education and long-term therapeutic intervention	Control group	Yes	Patients meeting same inclusion criteria admitted or treated in ED during same time period as intervention in other local hospitals

continued

Study	Intervention group(s)	Control group(s)		
		Name	Usual care?	Description
Kelso, 1996	Educational intervention with long-term management programme	Retrospective usual care group	Yes	Frequency of office visits for control patients could not be determined. 14 of 18 saw primary care physician, 4 saw pulmonologist/allergist
Mayo, 1990	Specialist clinic programme	Usual care	Yes	Regular outpatient care in chest or medical clinic at local hospital, neighbourhood clinics or local physicians
Mildenhall, 1998	Coping with asthma programme	Usual care	Yes	Treatment via primary care, outpatient clinics, A&E department or inpatient care as per local arrangements
White, 2001	Specialist consultation–liaison	Control group	Yes	None given
Zimmermann, 2000	Asthma intervention programme	Control group	Yes	Usual care provided by primary care practitioner

Appendix 27

Details of providers, structure, setting and timing of interventions for adults

Providers, structure, setting and timing of primarily educational interventions for adults

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Brewin, 1995	Patient education	Respiratory nurse	Individual	One or more, more shorter sessions as needed	Not stated	Most seen for >30 minutes	Not stated	Yes – immediately following hospital admission	Inpatient
Ford, 1997	Educational intervention	Nurse	Medium group (5–15)	3	Not stated	1 hour	Not stated	Yes – during A&E visit	A&E
Garrett, 1994	Community healthcare intervention	Nurse, community health worker	Individual	As needed (mean 3.7, range 1–10)	Not stated	Dependent on educational needs of patient	Until all topics had been covered	Yes – following recent attack	Home, community, other (workplace or as according to patients' wishes)

Providers, structure, setting and timing of self-management interventions for adults

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Blixen, 2001	Nurse-run asthma education programme	Nurse educator	Individual	3	Not stated	1 hour	Not stated	Yes – following admission	Inpatient
Morice, 2001	Education programme	Asthma nurse	Individual	Minimum of 2 plus one prior to discharge where possible	Consecutive days plus one prior to discharge	Average 30 minutes	2+ days, dependent on length of admission	Yes – initial assessment within 48 hours of admission	Inpatient
Osman, 2002	Self-management programme	Respiratory nurse	Individual	2	Not stated	30 min per session	Not stated	Yes – following admission	Inpatient
Yoon, 1993	Education programme	Not stated	Medium group (5–15)	1	Once only	2.5–3 hours	Single session only	Yes – Following hospital admission, no details on timing	Outpatient

Providers, structure, setting and timing of psychosocial interventions for adults

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Ago, 1980	Psychosomatic treatment	Doctor, psychologist, medical caseworker	Not stated	5 initial sessions then as needed	Inpatients 3 times per week; outpatients: once a week	20–50 minutes	Average 22.2 months (±13.8 months)	No	Inpatient, outpatient
Bowler, 1998	Buteyko breathing techniques	Representative of Buteyko Australia	Large group (>15)	Not stated	Not stated	60–90 minutes	7 days plus mean of 7 follow-up calls for 3 months	No	Not stated
	'Control intervention'	Instructor	Large group (>15)	Not stated	Not stated	60–90 minutes	7 days plus one follow-up call	No	Not stated
Ciurluini, 1993	Autogenic training	Not stated (but most likely psychologists)	Medium group (5–15)	12	Once per week	Not stated	3 months	No	Outpatient
	Cognitive–behavioural techniques	Not stated (but most likely psychologists)	Medium group (5–15)	12	Once per week	Not stated	3 months	No	Outpatient
	Psychotherapy with biofeedback	Not stated (but most likely psychologists)	Medium group (5–15)	12	Once per week	Not stated	3 months	No	Outpatient
Groen, 1960	Group psychotherapy	Physicians with no specific training in psychiatry but experience with individual psychotherapeutic techniques; support from psychiatrist, psychosomatic researchers	Not stated	Not stated	Twice per week	Planned 1 hour, actually up to 75 minutes	Over several years	No	Not stated

continued

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Manocha, 2002	Sahaja yoga	Sahaja yoga instructor	Not stated	16	Weekly	2 hours	4 months	No	Not stated
	'Control intervention'	Instructor	Group (size unspecified)	16	Weekly	Not stated	4 months	No	Not stated
Parry, 2002	Cognitive–behavioural therapy	Clinical psychologist	Individual	5–7 sessions	Not stated	Not stated	Not stated	No	Outpatient
Ross, 2002	Cognitive–behavioural treatment and asthma education	Nurse	Not stated	Not stated	Not stated	Not stated	Not stated	No	Not stated

Providers, structure, setting and timing of multifaceted interventions for adults

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
George, 1999	Comprehensive inpatient educational programme	Asthma clinical nurse specialist	Individual	Not stated	Not stated	Not stated	Dependent on length of stay (mean 2.1 days) with outpatient follow-up 7 days after discharge	Yes – begun during admission for acute exacerbation	Inpatient, outpatient
Gibson, 1995	Asthma management service	Physician, health educator	Not stated	4	Not stated	Not stated	Not stated	Yes – following admission	Outpatient

continued

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
Kelso, 1995	Education and long-term therapeutic intervention	Doctor, pharmacist	Individual	1	One education session, follow-up after 1 week, then every 2 weeks to 6 months	1 hour during average 4.4-hour stay in ED	1 year including clinic	Yes – immediately following ED	A&E
Kelso, 1996	Educational intervention with long-term management programme	Investigators	Individual	Not stated	Monthly initially, 2–3 monthly thereafter but based on need	1-hour initial visit	Not stated	No	Outpatient
Mayo, 1990	Specialist clinic programme	Respiratory nurse specialist, respiratory doctor	Individual	As needed	As needed (once per week to 1 every 6 months plus telephone contact between)	Initial >1 hour, subsequent $>\frac{1}{2}$ hour	Maximum 8 months	Yes – recruited following admission, unclear how long after intervention began	Outpatient
Mildenhall, 1998	Coping with asthma programme	Respiratory nurse specialist, health psychologist, GP liaison psychiatrist	Individual	4 visits, 8 telephone calls in total	Visits fortnightly for 2 months with telephone calls between followed by monthly telephone calls for 4 months	Around 1 hour	6 months	No	Home

continued

Study	Intervention(s)	Provider(s)	Delivery	Number of sessions	Frequency of sessions	Session duration	Intervention duration	Following asthma episode?	Intervention site(s)
White, 2001	Specialist consultation-liaison	Asthma nurse specialist, chest physician	Individual	Not stated	Not stated	Not stated	Not stated	Yes – during admission	Inpatient, primary care
Zimmermann, 2000	Asthma intervention programme	Asthma nurse specialist	Individual	Daily until discharge and follow-up telephone calls	Daily	Not stated	6 months including calls	Yes – immediately following admission	Inpatient

Appendix 28

Details of delivery methods and tools used in interventions for adults

Delivery methods and tools used in educational interventions for adults

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus-sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele-phone	Written information	Video	Audio	Com-puter	
Brewin, 1995	Patient education		Y	Y							Y				3
Ford, 1997	Educational intervention		Y	Y	Y				Y		Y		Y		6
Garrett, 1994	Community healthcare intervention		Y	Y							Y				3
All education studies		0	3	3	1	0	0	0	1	0	3	0	1	0	

Delivery methods and tools used in self-management interventions for adults

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus-sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele-phone	Written information	Video	Audio	Com-puter	
Blixen, 2001	Nurse-run asthma education programme	Y	Y	Y							Y	Y			5
Morice, 2001	Education programme	Y	Y	Y							Y				4
Osman, 2002	Self-management programme		Y	Y							Y				3
Yoon, 1993	Education programme	Y	Y	Y							Y	Y			5
All self-management studies		3	4	4	0	0	0	0	0	0	4	2	0	0	

Delivery methods and tools used in psychosocial interventions for adults

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus-sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele-phone	Written information	Video	Audio	Com-puter	
Ago, 1980	Psychosomatic treatment		Y	Y					Y						3
Bowler, 1998	Buteyko breathing techniques			Y					Y	Y					3
	'Control intervention'	Y[a]		Y					Y	Y					4
Ciurluini, 1993	Cognitive–behavioural techniques		Y		Y				Y						3
	Autogenic training		Y						Y						2
	Psychotherapy with biofeedback		Y						Y						2
Groen, 1960	Group psychotherapy		Y				Y		Y						3
Manocha, 2002	Sahaja yoga		Y	Y					Y			Y			4
	'Control intervention'		Y						Y						2
Parry, 2002	Cognitive behaviour therapy			Y	Y	Y			Y		Y				5
Ross, 2002	Cognitive–behavioural treatment and asthma education								Y						1 (little detail)
All psychosocial studies		0	4	4	2	1	1	0	7	1	1	1	0	0	

[a] The intervention in which this is relevant is not the primary one under consideration for this study so this was not counted.

Delivery methods and tools used in multifaceted interventions for adults

Study	Group	Delivery techniques								Supplementary tools					Total methods
		Lecture/ didactic	Discus-sion	Skills training	Problem solving	Goal setting	Role play	Games/ fun	Formal therapeutic	Tele-phone	Written information	Video	Audio	Com-puter	
George, 1999	Comprehensive inpatient educational programme	Y	Y	Y						Y					4
Gibson, 1995	Asthma management service			Y											1 (little detail)
Kelso, 1996	Educational intervention with long-term management programme		Y	Y						Y	Y				4
Kelso, 1995	Education and long-term therapeutic intervention	Y	Y	Y						Y	Y				5
Mayo, 1990	Specialist clinic programme		Y	Y						Y					3
Mildenhall, 1998	Coping with asthma programme		Y	Y	Y	Y	Y		Y	Y	Y				8
White, 2001	Specialist consultation–liaison	Y	Y	Y							Y				4
Zimmermann, 2000	Asthma intervention programme		Y	Y						Y	Y				4
All multifaceted studies		3	7	8	1	1	1	0	1	6	5	0	0	0	

Appendix 29

Asthma-specific topics covered by interventions for adults

Asthma-specific topics covered by educational interventions for adults

Study	Intervention	Asthma general	Asthma management						Asthma medication				Triggers		
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	Attendance issues
Brewin, 1995	Patient education	Y		Y			Y	Y for some	Y			Y	Y		
Ford, 1997	Educational intervention	Y		Y	Y				Y	Y	Y		Y	Y	
Garrett, 1994	Community healthcare intervention	Y		Y	Y	Y	Y	Y for some	Y	Y			Y	Y	Y
All educational studies		3	0	3	2	1	2	2	3	2	1	1	3	2	1

Asthma-specific topics covered by self-management interventions for adults

Study	Intervention	Asthma general	Asthma management						Asthma medication				Triggers		
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	Attendance issues
Blixen, 2001	Nurse-run asthma education programme	Y	Y	Y	Y		Y	Y	Y	Y	Y			Y	
Morice, 2001	Education programme	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y		
Osman, 2002	Self-management programme	Y	Y	Y	Y	Y	Y	Y	Y		Y		Y	Y	
Yoon, 1993	Education programme	Y		Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	
All self-management studies		4	3	4	4	3	4	4	4	3	3	1	3	3	0

Asthma-specific topics covered by psychosocial interventions for adults

Study	Group name	Asthma general	Asthma management						Asthma medication				Triggers		Attendance issues
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	
Ago, 1980	Psychosomatic treatment		Y		Y								Y	Y	
Bowler, 1998	Buteyko breathing techniques								Y		Y				
	'Control intervention'	Y							Y		Y				
Ciurluini, 1993	Autogenic training														
	Psychotherapy with biofeedback														
	Cognitive–behavioural techniques														
Groen, 1960	Group psychotherapy											Y			
Manocha, 2002	Sahaja yoga														
	'Control intervention'														
Parry, 2002	Cognitive–behaviour therapy	Y	Y	Y	Y	Y	Y	Y	Y		Y		Y	Y	
Ross, 2002	Cognitive–behavioural treatment and asthma education			Y											
All psychosocial studies		1	2	2	2	1	1	1	2	0	2	1	2	2	0

Asthma-specific topics covered by multifaceted interventions for adults

Study	Group name	Asthma general	Asthma management						Asthma medication				Triggers		
			Symptom recognition	Self-management principles	Attack management	Symptom monitoring	PEF use/ monitoring	Action plan	General	Inhaler use	Compliance	Side-effects	General	Avoiding	Attendance issues
George, 1999	Comprehensive inpatient educational programme	Y	Y	Y	Y			Y	Y	Y	Y	Y			Y
Gibson, 1995	Asthma management service	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				
Kelso, 1996	Educational intervention with long-term management programme	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kelso, 1995	Education and long-term therapeutic intervention	Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Mayo, 1990	Specialist clinic programme	Y		Y			Y	Y	Y	Y		Y			Y
Mildenhall, 1998	Coping with asthma programme	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
White, 2001	Specialist consultation–liaison			Y											
Zimmermann, 2000	Asthma intervention programme	Y	Y	Y	Y		Y	Y	Y	Y			Y	Y	
All multifaceted studies		7	5	8	6	3	6	7	7	7	5	5	4	4	5

Appendix 30

Issues indirectly related to asthma and its management covered by interventions for adults

Issues indirectly related to asthma and its management covered by educational interventions for adults

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Brewin, 1995	Patient education								
Ford, 1997	Educational intervention	Y	Y	Y	Y	Y		Y	Beliefs in self-care; stress management; physician communication; other medication
Garrett, 1994	Community healthcare intervention	Y		Y		Y	Y		Assessment of social, financial and cultural beliefs
All educational studies		2	1	2	1	2	1	1	

Issues indirectly related to asthma and its management covered by self-management interventions for adults

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Blixen, 2001	Nurse-run asthma education programme				Y	Y		Y	Dealing with stresses common to many African-Americans; communication with medical providers; telephone numbers for local organisations
Morice, 2001	Education programme				Y	Y		Y	Relatives included at patient's request; fears and anxieties related to home management; influence of lifestyle activities (leisure and occupation)
Osman, 2002	Self-management programme								
Yoon, 1993	Education programme	Y						Y	Encouraged to bring spouses or other key people
All self-management studies		1	0	0	2	2	0	3	

Issues indirectly related to asthma and its management covered by psychosocial interventions for adults

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
Ago, 1980	Psychosomatic treatment			Y	Y	Y		Y	5 stages of psychosomatic treatment which address patient–doctor relationship, stress, negative feelings, emotional and behavioural triggers, distorted perceptions, inadequate behaviours
Bowler, 1998	Buteyko breathing techniques				Y			Y	Breathing techniques, problems of hypoventilation
	'Control intervention'				Y				
Ciurluini, 1993	Autogenic training				Y				Psychological factors influencing asthma reviewed and techniques to manage taught
	Psychotherapy with biofeedback				Y				Psychological factors influencing asthma reviewed and techniques to manage taught
	Cognitive–behavioural techniques				Y				Psychological factors influencing asthma reviewed and techniques to manage taught
Groen, 1960	Group psychotherapy				Y	Y			Little detail on content
Manocha, 2002	Sahaja yoga				Y				Relaxation and stress management
	'Control intervention'				Y				
Parry, 2002	Cognitive–behavioural therapy			Y	Y				Aimed to address panic/anxiety, triggers for asthma and anxiety, understand automatic thoughts, catastrophic cognitions, mistaken beliefs, reduce confusion regarding symptoms, reduce safety-seeking behaviours
Ross, 2002	Cognitive–behavioural treatment and asthma education								Little detail on content
All psychosocial studies		0	0	2	6	2	0	2	

Issues indirectly related to asthma and its management covered by multifaceted interventions for adults

Study	Intervention	Smoking	Other health behaviours	Attitudes/ beliefs	Other psychological issues	Social or family issues	Economic issues	Other issues	Additional detail
George, 1999	Comprehensive inpatient educational programme				Y	Y	Y		Screened for obstacles to care including inability to fill prescriptions, lack of transportation, lack of child care, substance abuse which addressed with social worker
Gibson, 1995	Asthma management service								Little detail on content
Kelso, 1996	Educational intervention with long-term management programme			Y					
Kelso, 1995	Education and long-term therapeutic intervention		Y						
Mayo, 1990	Specialist clinic programme								
Mildenhall, 1998	Coping with asthma programme	Y	Y	Y	Y	Y	Y	Y	Topics and issues addressed according to individual need
White, 2001	Specialist consultation–liaison								Little detail on content
Zimmermann, 2000	Asthma intervention programme					Y			Social support
All multifaceted studies		1	2	2	2	3	2	1	

Appendix 31

Methodological quality characteristics of studies in adults

Quality characteristics of randomised controlled trials in adults

	Randomisation			Outcome assessment			Sample and attrition								Analysis and reporting		
Study	Method	Concealed?	Concealment method	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria? Power calculation		Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Blixen, 2001	Not stated	No	Not stated	Yes	No	Yes – pre-specified	28	Yes	Yes	70	Yes – minor differences	No	43	No	Yes	No	Yes
Bowler, 1998	Not stated	Yes	Serially numbered envelopes	Yes	No	Yes – one only	39	Yes	No	93	Yes – similar	No	Not stated	No	Yes	No	Yes
Ford, 1997	Not stated	No	Not stated	Yes	Yes – pre-specified	Yes – in results	163	Yes	Yes	42	Yes – similar	Yes – similar	100	No	Yes	Yes	Yes
Garrett, 1994	Not stated	No	Not stated	Yes	No	Yes – one only	500	Yes	No	51	Yes – similar	Yes – non-participants younger, admission rates similar	>90	Yes – similar	Yes	Yes – for some outcomes	No
George, 1999	Random number table	No	Not stated	No	No	Yes – one only	77	Yes	No	88	Yes – similar	No	65	No	Yes	Yes – for some outcomes	No
Manocha, 2002	Not stated	Yes	Serially numbered envelopes	Yes	No	No	59	Yes	Yes	49	Yes – minor differences	No	80	Yes – similar	Yes	Yes – but not actually done	Yes
Mayo, 1990	Patient record number	No	Not stated	No	Yes – in results	Yes – one only	104	Yes	No	100	Yes – similar	N/A	100	No	Yes	No – but actually done	No
Mildenhall, 1998	Computer generated	No	Not stated	No	Yes – pre-specified	Yes – pre-specified	92	Yes	No	51	Yes – differences in gender and education adjusted for	Planned	83	Planned	Yes	Planned	Yes

continued

Study	Randomisation			Outcome assessment			Sample and attrition							Analysis and reporting		
	Method	Concealed?	Concealment method	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria?	Power calculation	Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Morice, 2001	Not stated	No	Not stated	No	No	No	80	Yes	No	Not stated	Yes – minor differences	No	75	No	Yes	No – but actually done for some outcomes	No
Osman, 2002	Random number table	Yes	Serially numbered envelopes	Yes	Yes – pre-specified	Yes – pre-specified	280	Yes	Yes	60	Yes – differences in gender adjusted for	No	95	No	Yes	No	Yes
Parry, 2002	Not stated	No	Not stated	No	No	No	94	No	Yes	Not stated	No	No	Not stated	No	Not stated	No	No
White, 2001	Not stated	No	Not stated	No	Yes – one only	Yes – one only	146	Yes	No	Not stated	No	No	Not stated	No	Yes	No – but actually done	Yes
Yoon, 1993	Not stated	No	Not stated	Yes	No	Yes – in results	76	Yes	No	41	Yes – similar	Yes – women, non–smokers, those with physician more likely to participate	74	No	Yes	No	Yes
Zimmermann, 2000	Not stated	Yes	Not stated	No	No	Yes – one only	96	Yes	No	Not stated	Yes – minor differences	No	Not stated	No	Not state	No	No

Quality characteristics of controlled clinical trials in adults

	Outcome assessment			Sample and attrition								Analysis and reporting		
Study	Blinded?	Single primary outcome?	Single primary end-point?	Total sample size	Clear selection criteria?	Power calculation	Participation rate (%)	Checked baseline comparability of groups?	Checked comparability of non-participants?	Minimum follow-up (%)	Checked comparability of withdrawals?	Provided details of analysis?	Specified ITT analysis?	Adequate outcome reporting?
Ciurluini, 1993	No	Yes – prespecified	Yes – one only	36	Yes	No	Not stated	Yes – similar	No	Not stated	No	Yes	No – but actually done	No
Ross, 2002	No	No	No	25	Yes	No	Not stated	No	No	Not stated	No	Yes	No	No

Quality characteristics of controlled prospective observational studies in adults

		Outcome assessment			Sample and attrition								Analysis and reporting		
Study	**Selection of groups**	**Blinded?**	**Single primary outcome?**	**Single primary end-point?**	**Total sample size**	**Clear selection criteria?**	**Power calculation**	**Participation rate (%)**	**Checked baseline comparability of groups?**	**Checked comparability of non-participants?**	**Minimum follow-up (%)**	**Checked comparability of withdrawals?**	**Provided details of analysis?**	**Specified ITT analysis?**	**Adequate outcome reporting?**
Brewin, 1995	Concurrent comparison group selected from patients admitted to other hospitals in district	Yes	No	Yes – one only	45	Yes	No	100	No	N/A	70	No	No	No	No
Kelso, 1995	Control group meeting same criteria and treated at same time retrospectively identified from other hospitals in area serving similar population (low income, African-Americans)	No	No	Yes – one only	52	Yes	No	Not stated	Yes – differences in age and adult-onset asthma adjusted for	No	Not stated	No	No	No – but actually done	Yes
Kelso, 1996	Control group identified via chart review	No	No	No	39	Yes	No	Not stated	Yes – similar	No	Not stated	No	Yes	No	Yes

Quality characteristics of controlled retrospective observational studies in adults

		Outcome assessment			Sample and attrition								Analysis and reporting		
Study	**Selection of groups**	**Blinded?**	**Single primary outcome?**	**Single primary end-point?**	**Total sample size**	**Clear selection criteria?**	**Power calculation**	**Participation rate (%)**	**Checked baseline comparability of groups?**	**Checked comparability of non-participants?**	**Minimum follow-up (%)**	**Checked comparability of withdrawals?**	**Provided details of analysis?**	**Specified ITT analysis?**	**Adequate outcome reporting?**
Ago, 1980	Retrospective analysis of 2 groups at study centre: patients who had accepted psychosomatic treatment vs patients who did not and received only medical treatment	No	Yes – one only	Yes – one only	166	Yes	No	All identi-fied	Yes – similar	N/A	100	No	No	N/A	Yes
Gibson, 1995	Retrospective audit of patients who attended service and those not referred	No	Yes – in results	Yes – one only	135 (inter-vention only)	No	No	58	No – unlikely to be similar	No	Not stated	No	No	N/A	No
Groen, 1960	Retrospective identification of groups receiving different treatments at same centre	No	Yes – one only	Yes – one only	162	Yes	No	All ident-ified	Yes – age differences adjusted for	N/A	91	No	Yes	N/A	Yes

Appendix 32

Quality characteristics of economic studies in adults

No.	*BMJ* Referees' Checklist	Kelso, 1995	Mayo, 1990	Mildenhall 1998	Zimmermann, 2000
	Study design				
1	The *economic* research question is stated			Y	
2	The economic importance of the research question is stated		Y	Y	Y
3	The viewpoint(s) of the analysis are clearly stated and justified				
4	The rationale for choosing the alternative programmes or interventions compared is stated	Y	Y	Y	Y
5	The alternatives being compared are clearly described	Y	Y	Y	Y
6	The form of economic evaluation used is stated			Y	
7	The choice of form of economic evaluation is justified in relation to the questions addressed			Y	
	Data collection				
8	The source(s) of effectiveness estimates used are stated	Y	Y	Y	Y
9	Details of the design and results of effectiveness study are given (if based on a single study)	Y	Y	Y	Y
10	Details of the method of synthesis or meta-analysis of estimates are given (if based on an overview of a number of effectiveness studies)				
11	The primary outcome measure(s) for the economic evaluation are clearly stated	Y	Y	Y	Y
12	Methods to value health states and other benefits are stated			Y	
13	Details of the subjects from whom valuations were obtained are given			Y	
14	Productivity changes (if included) are reported separately			Y	Y
15	The relevance of productivity changes to the study question is discussed		Y	Y	
16	Quantities of resources are reported separately from their unit costs	Y	Y	Y	
17	Methods for the estimation of quantities and unit costs are described	Y		Y	
18	Currency and price data are recorded			Y	
19	Details of currency of price adjustments for inflation or currency conversion are given				
20	Details of any model used are given				
21	The choice of model used and the key parameters on which it is based are justified				
	Analysis and interpretation of results				
22	Time horizon of costs and benefits is stated	Y	Y	Y	Y
23	The discount rate(s) is stated				
24	The choice of rate(s) is justified				
25	An explanation is given if costs or benefits are not discounted				
26	Details of statistical tests and confidence intervals are given for stochastic data	Y	Y	Y	
27	The approach to sensitivity analysis is given			Y	
28	The choice of variables for sensitivity analysis is justified			Y	
29	The ranges over which the variables are varied are stated				
30	Relevant alternatives are compared				
31	Incremental analysis is reported				
32	Major outcomes are presented in a disaggregated as well as aggregated form		Y	Y	Y

continued

No.	*BMJ* Referees' Checklist	Kelso, 1995	Mayo, 1990	Mildenhall 1998	Zimmermann, 2000
33	The answer to the study questions given	Y		Y	
34	Conclusions follow from the data reported	Y	Y	Y	Y
35	Conclusions are accompanied by the appropriate caveats	Y	Y	Y	
	Number of 'Yes'	**12**	**13**	**24**	**10**

Appendix 33

Cost and cost-effectiveness data for studies in adults

All studies used US$ as the currency, apart from the Mildenhall study, which used UK£.

	Kelso, 1995	Mayo, 1990	Mildenhall, 1998	Zimmermann, 2000
Intervention	Education session in ED	Vigorous medical regimen and educational programme	Specialist nurse-led home-based psycho-educational programme	Nurse specialist education for inpatients
Comparator	Usual care in hospitals in same area	Usual outpatient care	Usual care for patients in local health system	Usual care from primary care providers
Price year	<1995	<1990	2001	<2002
Period for costs (months)	12	8	6 (12 planned)	6
Number in intervention group for economic analysis	30	47	41	49
Number in control group for economic analysis	22 (30 eligible)	57	39	47
Intervention costs per intervention patient	Not reported	Not reported	Mean £1271 (SD £43.62, 95% CI £1258 to 1285)	Not reported
Healthcare costs excluding intervention costs per intervention patient	Not reported	Not reported	Mean £4,081 (SD £5007, 95% CI £2501 to 5662)	Hospital admissions: 28 ED visits: 99 Lost work days: 123 Total direct healthcare costs: $134,467 Total indirect costs: $49,566
Healthcare costs plus intervention costs per intervention patient	Not reported	$2100	Mean £5353 (SD £5016, 95% CI £3769 to 6936)	Unclear whether included in previous costs
Healthcare costs per control patient	Not reported	$4000	Mean £2387 (SD £2177, 95% CI £1682 to 3093)	Hospitalisations: 58 ED visits: 137 Lost work days: 520 Total direct healthcare costs: $256,892 Total indirect healthcare costs: $97,663

continued

	Kelso, 1995	Mayo, 1990	Mildenhall, 1998	Zimmermann, 2000
Difference in healthcare costs per patient excluding intervention costs	41% ↓ in ED visits, no difference in admissions	Not reported	Not reported	Not reported (but see below)
Difference in healthcare costs per patient including intervention costs	Not reported	Not reported (↓ $1,900)	Statistically significant increase in costs	Net saving of $3480 per patient (unclear whether intervention cost is included)
Unit costs	Average charge for ED visit $360	Not reported	Not yet reported	Not reported
Measures of health benefit	Inhaler technique and knowledge, health service use	Use of health services and medications	Asthma control score, QoL	Asthma QoL
Cost-effectiveness estimates	Saving of $295,000 per year in department from fewer ED visits	Not reported	No significant differences in health outcomes, net healthcare cost increase. Cost–utility and sensitivity analyses not yet reported	Not reported
Authors' conclusions about cost-effectiveness	None	"We believe that the treatment of adult asthmatics using the methods described is cost effective"	Home-based nurse intervention was ineffective in improving health outcomes and resulted in increased costs at 6 months	"Improved asthma control and quality of life with substantial cost savings'

Feedback

The HTA Programme and the authors would like to know your views about this report.

The Correspondence Page on the HTA website (http://www.ncchta.org) is a convenient way to publish your comments. If you prefer, you can send your comments to the address below, telling us whether you would like us to transfer them to the website.

We look forward to hearing from you.

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